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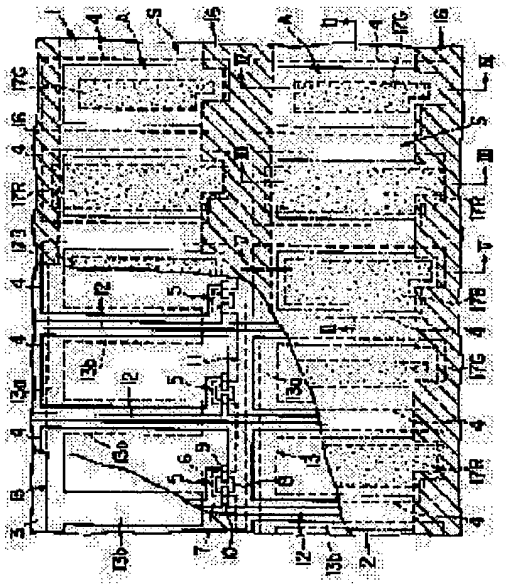
(54) LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a two-way display type liquid crystal display device capable of improving brightness on the screen through reflective display, reducing power consumption by reducing the emitting frequency of illuminating light for supplementing the screen brightness and displaying a color image with sufficient brightness and good contrast.
SOLUTION: A compensating capacity electrode 13, which is provided on the rear side inner surface of a substrate 3 in a liquid crystal display element 1, is formed into a shape, which has an extension 13b corresponding to the area between pixel electrodes adjacent with a data line 12 held in between, by means of a metal film of a high reflectivity. Among the areas corresponding to the pixel electrodes 4, an area enclosed by the compensating capacity electrode 13 and a light-shielding film 16, which corresponds to the area between the pixel electrodes adjacent with a gate line 11 held in between, is made a transmitting area A, while an area corresponding to the extension 13b of the compensating capacity electrode 13 is made a reflection area S. Also the areas for color filters 17R, 17G, 17B are made smaller than that of the transmitting area A, which emits coloring light and non-colored light from the transmitting area A, and emitting non-colored reflected light from the reflection area S.



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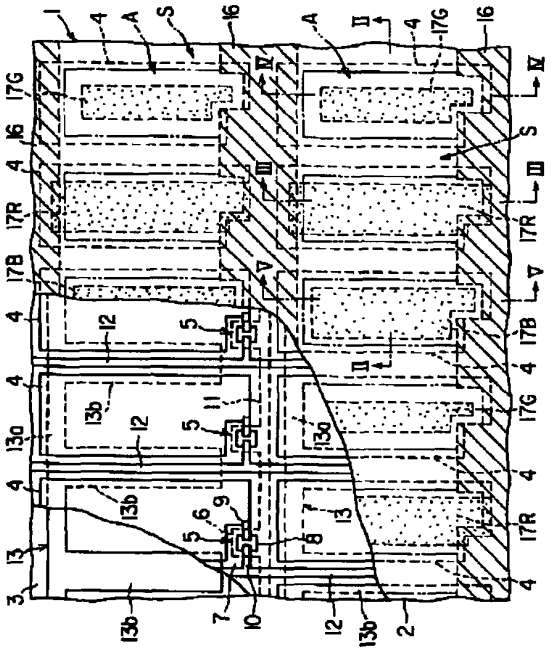
(54)【発明の名称】　液晶表示装置

(57)【要約】
【課題】反射型表示による画面の明るさを向上させ、画面輝度を補う照明光の出射頻度を少なくして消費電力を低減するとともに、充分な明るさでコントラストの良いカラー画像を表示できる２ウエイ表示型の液晶表示装置を提供する。
【解決手段】液晶表示素子１の背面側基板３の内面に設けた補償容量電極１３を、高反射率の金属膜により、データライン１２をはさんで隣り合う画素電極間の領域に対応する延長部１３ｂを有する形状に形成し、画素電極４に対応する領域のうちの補償容量電極１３とゲートライン１１をはさんで隣り合う画素電極間の領域に対応する遮光膜１６とにより囲まれた領域を透過領域Ａとし、補償容量電極１３の延長部１３ｂに対応する領域を反射領域Ｓとするとともに、カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの面積を透過領域Ａの面積よりも小さくし、前記透過領域Ａから着色光と非着色光とを出射させ、前記反射領域Ｓから非着色の反射光を出射させるようにした。



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【特許請求の範囲】

【請求項１】アクティブマトリックス方式の液晶表示素子と、前記液晶表示素子の背後に配置され、照明光を前記液晶表示素子に向けて出射するとともに、前記液晶表示素子の前方から入射する外光を前記液晶表示素子に向けて反射する照明手段とを備え、

前記液晶表示素子の液晶層をはさんで対向する前面側および背面側の一対の基板のうちの背面側基板の内面に、行方向および列方向にマトリックス状に配列する複数の画素電極と、この各画素電極にそれぞれ接続された複数の薄膜トランジスタと、各画素電極行ごとにその一側に沿わせて配線され前記薄膜トランジスタにゲート信号を供給するゲートラインと、各画素電極列ごとにその一側に沿わせて配線され前記薄膜トランジスタにデータ信号を供給するデータラインと、前記各画素電極行ごとに形成され前記画素電極の縁部に絶縁膜を介して対向して前記画素電極との間に補償容量を形成する補償容量電極とが設けられ、前面側基板の内面に、前記各画素電極に対向する対向電極と、前記複数の画素電極の間の領域のうちの少なくとも前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域に対応する遮光膜とが設けられ、前記一対の基板のいずれか一方の内面に、透過波長帯域の異なる複数の色の着色膜が、前記複数の画素電極にそれぞれ対応させて行方向に交互に並べて設けられており、

前記補償容量電極が、光の反射率が高い金属膜により、行方向に配列する前記画素電極の一端縁部に対向するライン部と、このライン部から前記データラインをはさんで行方向に隣り合う画素電極間の領域に延長されてその両側縁部において行方向に隣り合う前記画素電極の側縁部にそれぞれ対向する延長部とを有する形状に形成され、

前記複数の画素電極にそれぞれ対応する領域のうちの前記補償容量電極と前記遮光膜とにより囲まれた領域がそれぞれ、背面側から入射する前記照明光および前方から入射し前記照明手段により反射される外光を前方に出射する複数の透過領域となっており、前記補償容量電極の少なくとも前記延長部に対応する領域が、前方から入射する外光を前記補償容量電極により反射させて前方に出射する反射領域となっているとともに、

前記複数の色の着色膜がそれぞれ、前記透過領域の面積よりも小さい面積を有しており、

前記複数の透過領域の前記着色膜に対応する領域から着色光がそれぞれ出射し、前記着色膜に対応しない領域から非着色光がそれぞれ出射し、前記補償容量電極の少なくとも前記延長部に対応する前記反射領域から前記補償容量電極により反射された非着色光が出射することを特徴とする液晶表示装置。

【請求項２】前記複数の色の着色膜は、可視光帯域のうちの長波長帯域の光を透過させる第１の色の着色膜と、

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中間波長帯域の光を透過させる第２の色の着色膜と、短波長帯域の光を透過させる第３の色の着色膜との３色の着色膜であり、前記第１の色の着色膜が他の２色の着色膜の面積よりも大きい面積を有しており、前記他の２色の着色膜のうちの前記第２の色の着色膜が前記第３の色の着色膜の面積よりも小さい面積を有していることを特徴とする請求項１に記載の液晶表示装置。

【請求項３】前記第１の色の着色膜は赤色フィルタ、前記第２の色の着色膜は緑色フィルタ、前記第３の色の着色膜は青色フィルタであり、前記赤色フィルタが前記透過領域の面積の９０～９５％の面積を有し、前記緑色フィルタが前記透過領域の面積の７０～８０％の面積を有し、前記青色フィルタが前記透過領域の面積の８５～９０％の面積を有していることを特徴とする請求項３に記載の液晶表示装置。

【請求項４】前記複数の画素電極および透光領域がそれぞれ、行方向の幅よりも列方向の幅が大きい長方形形状に形成されていることを特徴とする請求項２または３に記載の液晶表示装置。

【請求項５】前記３色の着色膜のうち、前記透過領域に対する面積比が所定の値よりも大きい着色膜が、前記透過領域の行方向の幅よりも小さい幅と、少なくとも前記透過領域の列方向全長にわたる長さとを有する形状に形成され、それよりも面積比が小さい着色膜が、前記補償容量電極の延長部の間の領域の幅よりも小さい幅と、前記透過領域の列方向長さよりも小さい長さとを有する形状に形成されており、前記面積比の大きい着色膜に対応する透過領域の行方向における前記着色膜の側方の領域から非着色光が出射し、前記面積比の小さい着色膜に対応する透過領域の行方向における前記着色膜の側方の領域および列方向における前記着色膜の側方の領域から非着色光が出射することを特徴とする請求項４に記載の液晶表示装置。

【請求項６】前記透過領域に対する面積比が約９０％以上の着色膜が、前記透過領域の行方向の幅よりも小さい幅と、少なくとも前記透過領域の列方向全長にわたる長さとを有する形状に形成されていることを特徴とする請求項５に記載の液晶表示装置。

【請求項７】前記面積比の大きい着色膜は、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極の延長部との間に間隙を存して設けられており、この着色膜に対応する透過領域の行方向における前記着色膜の両側の領域から非着色光が出射することを特徴とする請求項５に記載の液晶表示装置。

【請求項８】前記面積比の大きい着色膜は、行方向に配列する複数の透過領域にわたって連続するストライプ状に形成されていることを特徴とする請求項４または５に記載の液晶表示装置。

【請求項９】前記面積比の小さい着色膜は、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極の

延長部との間、および両端縁とこれらの端縁にそれぞれ隣り合う前記補償容量電極のライン部および前記遮光膜との間にそれぞれ間隙を存して設けられており、この着色膜に対応する透過領域の前記着色膜の周囲の領域から非着色光が出射することを特徴とする請求項５に記載の液晶表示装置。

【請求項１０】前記遮光膜は、前記ゲートラインをはさんで列方向に隣り合う一方の画素電極の縁部から他方の画素電極に対向する前記補償容量電極のライン部にわたる領域を覆う幅に形成されていることを特徴とする請求項１に記載の液晶表示装置。

【請求項１１】前記遮光膜は、前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域と、前記データラインをはさんで行方向に隣り合う画素電極間の領域とに対応させて設けられるとともに、この遮光膜の前記データラインをはさんで行方向に隣り合う画素電極間の領域に対応する部分が、前記補償容量電極の前記延長部の幅よりも狭く、かつ前記データラインの全幅を覆う幅に形成されていることを特徴とする請求項１に記載の液晶表示装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、反射型表示と透過型表示との両方の表示を行なう２ウエイ表示型の液晶表示装置に関するものである。

【０００２】

【従来の技術】液晶表示装置として、その使用環境の光である外光（自然光や室内光等）を利用する反射型表示と、一般にバックライトと呼ばれる照明手段からの照明光を利用する透過型表示との両方の表示を行なう、いわゆる２ウエイ表示型のものがある。

【０００３】この２ウエイ液晶表示装置は、液晶表示素子の背後に、照明光を前記液晶表示素子に向けて出射するとともに、前記液晶表示素子の前方から入射する外光を前記液晶表示素子に向けて反射する照明手段を配置して構成されている。

【０００４】前記２ウエイ液晶表示装置は、充分な明るさの外光が得られるときは前記照明手段から照明光を出射させずに外光を利用する反射型表示を行ない、外光の明るさが不足するときに、前記照明手段から照明光を出射させて画面輝度を補うようにしたものであり、前記照明手段としては、一般に、照明光を出射する照明パネルの前面に半透過反射板を配置したものが用いられている。

【０００５】また、前記液晶表示素子としては、一般に、アクティブ素子に薄膜トランジスタ（以下、ＴＦＴと記す）を用いたアクティブマトリックス方式のものが使用されている。

【０００６】アクティブマトリックス液晶表示素子は、液晶層をはさんで対向する前面側および背面側の一対の

基板のうちの背面側基板の内面に、行方向および列方向にマトリックス状に配列する複数の画素電極と、この各画素電極にそれぞれ接続された複数のＴＦＴと、各画素電極行ごとにその一側に沿わせて配線され前記ＴＦＴにゲート信号を供給するゲートラインと、各画素電極列ごとにその一側に沿わせて配線され前記ＴＦＴにデータ信号を供給するデータラインと、前記各画素電極行ごとに形成され前記画素電極の縁部に絶縁膜を介して対向して前記画素電極との間に補償容量を形成する補償容量電極とが設けられ、前面側基板の内面に、前記各画素電極に対向する対向電極と、前記複数の画素電極の間の領域に対応する遮光膜とが設けられた構成となっている。

【０００７】このアクティブマトリックス液晶表示素子には、白黒画像を表示するものと、フルカラー画像等の多色カラー画像を表示するものとがあり、カラー画像を表示する液晶表示素子は、前記一対の基板のいずれか一方（一般には前面側基板）の内面に、透過波長帯域の異なる複数の色の着色膜を、前記複数の画素電極にそれぞれ対応させて行方向に交互に並べて設けた構成となっている。

【０００８】前記複数の色の着色膜は、例えば一般に、赤、緑、青の３色のカラーフィルタであり、従来の液晶表示素子では、前記複数の画素電極に対応する領域を透過する光のほとんどを着色光として出射するため、前記複数の色の着色膜をそれぞれ、前記画素電極に対応する領域全体に対応させて設けている。

【０００９】

【発明が解決しようとする課題】しかし、従来のカラー画像を表示する２ウエイ液晶表示装置は、反射型表示による画面の明るさが暗く、比較的明るい環境下でも、前記照明手段から照明光を出射させて画面輝度を補う必要がある。

【００１０】これは、液晶表示素子を透過する光のうちの前記着色膜の吸収波長帯域の波長成分の光が前記着色膜により吸収され、前記着色膜の透過波長帯域の波長成分の光が前記着色膜を透過して着色光となって出射するためであり、外光を利用する反射型表示のときは、前方から入射する外光が使用環境の明るさに応じた強度の光であり、その光が、液晶表示素子を透過してその背後の照明手段により反射され、再び前記液晶表示素子を透過してその前面に出射する過程で前記着色膜を二度通るため、出射する着色光の強度が、前方から入射する外光の強度に比べて極端に低くなる。

【００１１】そのため、従来の２ウエイ液晶表示装置は、比較的明るい環境下でも、前記照明手段から照明光を出射させて画面輝度を補う必要があり、したがって、消費電力が大きいという問題をもっている。

【００１２】この発明は、反射型表示による画面の明るさを向上させ、画面輝度を補うために前記照明手段から照明光を出射させる頻度を少なくして消費電力を低減す

るとともに、充分な明るさでコントラストの良いカラー画像を表示することができる２ウエイ表示型の液晶表示装置を提供することを目的としたものである。

【００１３】

【課題を解決するための手段】この発明の液晶表示装置は、アクティブマトリックス方式の液晶表示素子と、前記液晶表示素子の背後に配置され、照明光を前記液晶表示素子に向けて出射するとともに、前記液晶表示素子の前方から入射する外光を前記液晶表示素子に向けて反射する照明手段とを備え、前記液晶表示素子の液晶層をはさんで対向する前面側および背面側の一対の基板のうちの背面側基板の内面に、行方向および列方向にマトリックス状に配列する複数の画素電極と、この各画素電極にそれぞれ接続された複数の薄膜トランジスタと、各画素電極行ごとにその一側に沿わせて配線され前記薄膜トランジスタにゲート信号を供給するゲートラインと、各画素電極列ごとにその一側に沿わせて配線され前記薄膜トランジスタにデータ信号を供給するデータラインと、前記各画素電極行ごとに形成され前記画素電極の縁部に絶縁膜を介して対向して前記画素電極との間に補償容量を形成する補償容量電極とが設けられ、前面側基板の内面に、前記各画素電極に対向する対向電極と、前記複数の画素電極の間の領域のうちの少なくとも前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域に対応する遮光膜とが設けられ、前記一対の基板のいずれか一方の内面に、透過波長帯域の異なる複数の色の着色膜が、前記複数の画素電極にそれぞれ対応させて行方向に交互に並べて設けられており、前記補償容量電極が、高い光反射率を有する金属膜により、行方向に配列する前記画素電極の一端縁部に対向するライン部と、このライン部から前記データラインをはさんで行方向に隣り合う画素電極間の領域に延長されてその両側縁部において行方向に隣り合う前記画素電極の側縁部にそれぞれ対向する延長部とを有する形状に形成され、前記複数の画素電極にそれぞれ対応する領域のうちの前記補償容量電極と前記遮光膜とにより囲まれた領域がそれぞれ、背面側から入射する前記照明光および前方から入射し前記照明手段により反射される外光を前方に出射する複数の透過領域となっており、前記補償容量電極の少なくとも前記延長部に対応する領域が、前方から入射する外光を前記補償容量電極により反射させて前方に出射する反射領域となっているとともに、前記複数の色の着色膜がそれぞれ、前記透過領域の面積よりも小さい面積を有しており、前記複数の透過領域の前記着色膜に対応する領域から着色光がそれぞれ出射し、前記着色膜に対応しない領域から非着色光がそれぞれ出射し、前記補償容量電極の少なくとも前記延長部に対応する前記反射領域から前記補償容量電極により反射された非着色光が出射することを特徴とするものである。

【００１４】この液晶表示装置は、充分な明るさの外光が得られるときは前記照明手段から照明光を出射させずに外光を利用する反射型表示を行ない、外光の明るさが不足するときに、前記照明手段から照明光を出射させて画面輝度を補う２ウエイ表示型のものであり、外光が得られる環境下では、前記液晶表示素子にその前方から入射する外光のうち、前記複数の画素電極にそれぞれ対応する領域のうちの前記補償容量電極と前記遮光膜とにより囲まれた複数の透過領域に入射した光が、この透過領域を透過して液晶表示素子の背面側に配置された照明手段により反射され、その反射光が前記透過領域を透過して液晶表示素子の前方に出射するとともに、前記補償容量電極に対応する反射領域に入射した光が、背面側基板の内面において前記補償容量電極により反射され、その反射光が液晶表示素子の前方に出射する。

【００１５】また、前記照明手段から照明光を出射させると、その照明光が前記液晶表示素子にその背面から入射し、その照明光のうち、前記補償容量電極および遮光膜に対応する領域に入射した光は、この補償容量電極および遮光膜により遮光され、前記透過領域に入射した光だけが、この透過領域を透過して液晶表示素子の前方に出射する。

【００１６】そして、この液晶表示装置では、前記複数の色の着色膜がそれぞれ前記透過領域の面積よりも小さい面積を有しているため、外光を利用する反射型表示を行なうときも、また前記照明手段から照明光を出射させて画面輝度を補うときも、前記複数の透過領域の前記着色膜に対応する領域からそれぞれ前記着色膜によりその吸収波長帯域の波長成分の光を吸収されて前記着色膜の色に着色した着色光（着色膜の透過波長帯域の波長成分の光）が出射し、前記複数の透過領域の着色膜に対応しない領域からそれぞれ前記着色膜による吸収を受けない非着色光が出射する。

【００１７】そのため、前記液晶表示素子の複数の透過領域からそれぞれ出射する光により表示される各色のカラー画素は、その透過領域に対応する着色膜の色に着色し、しかもその明るさを、前記着色膜での吸収による輝度低下のない非着色光により底上げされた画素であり、したがって、外光を利用する反射型表示を行なうときも、また前記照明手段から照明光を出射させて画面輝度を補うときも、前記透過領域の全域から着色膜により着色された着色光を出射させる場合に比べて、はるかに明るいカラー画像を表示することができる。

【００１８】さらに、この液晶表示装置においては、前記補償容量電極を、光の反射率が高い金属膜により、行方向に配列する前記画素電極の一端縁部に対向するライン部と、このライン部から前記データラインをはさんで行方向に隣り合う画素電極間の領域に延長されてその両側縁部において行方向に隣り合う前記画素電極の側縁部にそれぞれ対向する延長部とを有する形状に形成しているため、前記液晶表示素子にその前方から入射した外光

のうち、前記補償容量電極の少なくとも前記延長部に対応する反射領域に入射した光が、前記背面側基板の内面において前記補償容量電極により反射され、前記着色膜での吸収による輝度低下がない非着色光のまま液晶表示素子の前方に出射する。

【００１９】また、前記補償容量電極に対応する反射領域のうちの隣り合う画素電極の間に対応する領域、つまり前記画素電極と対向電極との間に印加される駆動電界が作用しない領域の液晶分子の配向状態は初期配向状態からほとんど変化しないため、前記反射領域のうちの前記画素電極間の領域に入射した外光の反射率は常に高く保たれる。

【００２０】そのため、外光を利用する反射型表示のときの画面の明るさは、前記複数の透過領域からそれぞれ出射する光（着色光と非着色光）により表示される各色のカラー画素の明るさが、前記透過領域の全域から着色膜により着色された着色光を出射させる場合に比べてはるかに明るく、しかも、前記補償容量電極に対応する反射領域から出射する非着色の反射光により画面全体の明るさを底上げされた充分な明るさである。

【００２１】したがって、この液晶表示装置によれば、反射型表示による画面の明るさを向上させ、画面輝度を補うために前記照明手段から照明光を出射させる頻度を少なくして消費電力を低減することができる。

【００２２】また、この液晶表示装置は、外光の明るさが不足するときに、前記照明手段から照明光を出射させて画面輝度を補うものであるが、前記照明手段からの照明光のうち、前記補償容量電極および遮光膜に対応する領域に入射した光はこの補償容量電極および遮光膜により遮光されるため、前記照明手段から照明光を出射させても、前記データラインをはさんで行方向に隣り合う画素電極間の領域（補償容量電極の延長部に対応する領域）から出射する光は、液晶表示素子の前方から入射した外光の反射光だけであり、そのため、前記照明手段から照明光を出射させたときに、前記データラインをはさんで行方向に隣り合う画素電極間の領域が明るくなり過ぎて表示画像のコントラストが低下することはない。

【００２３】さらに、前記液晶表示素子の前面側基板の内面に設けられた前記遮光膜が、前記複数の画素電極の間の領域のうちの少なくとも前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域に対応しているため、この遮光膜が対応する画素電極間の領域は、外光を利用する反射型表示を行なうときも、また前記照明手段から照明光を出射させて画面輝度を補うときも暗状態であり、それによっても表示画像のコントラストを良くすることができる。

【００２４】

【発明の実施の形態】この発明の液晶表示装置は、アクティブマトリックス方式の液晶表示素子と、前記液晶表示素子の背後に配置され、照明光を前記液晶表示素子に向けて出射するとともに、前記液晶表示素子の前方から入射する外光を前記液晶表示素子に向けて反射する照明手段とを備えた２ウエイ表示型のものであり、上記のように、前記液晶表示素子の背面側基板の内面に設けられた補償容量電極を、高い光反射率を有する金属膜により、行方向に配列する画素電極の一端縁部に対向するライン部と、このライン部からデータラインをはさんで行方向に隣り合う画素電極間の領域に延長されてその両側縁部において行方向に隣り合う前記画素電極の側縁部にそれぞれ対向する延長部とを有する形状に形成し、複数の画素電極にそれぞれ対応する領域のうちの前記補償容量電極と、前記複数の画素電極の間の領域のうちの少なくとも前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域に対応させて前面側基板の内面に設けられた遮光膜とにより囲まれた領域をそれぞれ、背面側から入射する前記照明光および前方から入射し前記照明手段により反射される外光を前方に出射する複数の透過領域とし、前記補償容量ときは、前記赤色フィルタを前記透過領域の面積の９０～９５％の面積に形成し、前記緑色フィルタを前記透過領域の面積の７０～８０％の面積に形成し、前記青色フィルタを前記透過領域の面積の８５～９０％の面積に形成するのが好ましく、このようにすることにより、赤、緑、青の各色のカラー画素の彩度および明るさのバランスが良い、色再現性の高いカラー画像を表示することができる。

【００２５】さらに、前記複数の画素電極および透光領域はそれぞれ、行方向の幅よりも列方向の幅が大きい長方形形状に形成するのが望ましく、このようにすることにより、行方にすることにより、反射型表示による画面の明るさを向上させ、画面輝度を補うために前記照明手段から照明光を出射させる頻度を少なくして消費電力を低減するとともに、充分な明るさでコントラストの良いカラー画像を表示することができるようにしたものである。

【００２６】この発明の液晶表示装置において、前記複数の色の着色膜が、可視光帯域のうちの長波長帯域の光を透過させる第１の色の着色膜と、中間波長帯域の波長成分の光を透過させる第２の色の着色膜と、短波長帯域の波長成分の光を透過させる第３の色の着色膜との３色の着色膜である場合は、前記第１の色の着色膜を他の２色の着色膜の面積よりも大きい面積に形成し、前記他の２色の着色膜のうちの前記第２の色の着色膜を前記第３の色の着色膜の面積よりも小さい面積に形成するのが望ましく、このようにすることにより、前記複数の透過領域からそれぞれ出射する着色光と非着色光とにより表示される各色のカラー画素の彩度および明るさをバランスさせ、色再現性の良いカラー画像を表示することができる。

【００２７】その場合、例えば前記第１の色の着色膜が赤色フィルタ、前記第２の色の着色膜が緑色フィルタ、

前記第３の色の着色膜が青色フィルタであるときは、前記赤色フィルタを前記透過領域の面積の９０～９５％の面積に形成し、前記緑色フィルタを前記透過領域の面積の７０～８０％の面積に形成し、前記青色フィルタを前記透過領域の面積の８５～９０％の面積に形成するのが好ましく、このようにすることにより、赤、緑、青の各色のカラー画素の彩度および明るさのバランスが良い、色再現性の高いカラー画像を表示することができる。

【００２８】さらに、前記複数の画素電極および透光領域はそれぞれ、行方向の幅よりも列方向の幅が大きい長方形形状に形成するのが望ましく、このようにすることにより、行方向に配列する複数の透過領域から複数の色の着色光を小さいピッチで交互に出射してそれらの混色を良好にし、高い解像度のカラー画像を表示することができる。

【００２９】このように前記透光領域を行方向の幅よりも列方向の幅が大きい長方形形状に形成する場合は、前記３色の着色膜のうち、前記透過領域に対する面積比が所定の値よりも大きい着色膜を、前記透過領域の行方向の幅よりも小さい幅と少なくとも前記透過領域の列方向全長にわたる長さとを有する形状に形成し、それよりも面積比が小さい着色膜を、前記補償容量電極の延長部の間の領域の幅よりも小さい幅と前記透過領域の列方向長さよりも小さい長さとを有する形状に形成することにより、前記面積比の大きい着色膜に対応する透過領域の行方向における前記着色膜の側方の領域から非着色光が出射し、前記面積比の小さい着色膜に対応する透過領域の行方向における前記着色膜の側方の領域および列方向における前記着色膜の側方の領域から非着色光が出射するようにするのが好ましく、このようにすることにより、複数の透過領域からそれぞれ出射する着色光と非着色光とにより表示される各色のカラー画素の彩度および明るさをより良くバランスさせ、さらに色再現性の良いカラー画像を表示することができる。

【００３０】すなわち、前記面積比が大きい着色膜に対応する透過領域は、その領域中に占める非着色光出射領域の面積が小さいため、この透過領域においても前記着色膜の側方の領域および列方向における前記着色膜の側方の領域の両方から非着色光を出射させるようにすると、非着色光の出射幅がかなり狭くなり、この透過領域から出射する着色光と非着色光とにより表示されるカラー画素の明るさの底上げ効果が充分に発揮されなくなって、前記カラー画素の彩度が黒っぽくなってしまう。

【００３１】しかし、上記のように、前記面積比が所定の値よりも大きい着色膜を、前記透過領域の行方向の幅よりも小さい幅と、少なくとも前記透過領域の列方向全長にわたる長さとを有する形状に形成し、この着色膜に対応する透過領域からは、行方向における前記着色膜の側方の領域からだけ非着色光が出射するようにすれば、この透過領域からも非着色光を充分な幅で出射させ、前記カラー画素の明るさの底上げ効果を充分に発揮して、良好な彩度および明るさのカラー画素を表示することができる。

【００３２】なお、行方向における前記着色膜の側方の領域および列方向における前記着色膜の側方の領域の両方から非着色光を出射させるようにすると非着色光の出射領域の幅がかなり狭くなってカラー画素の明るさの底上げ効果が充分に発揮されなくなる透過領域は、前記面積比が約９０％以上の着色膜に対応する透過領域であり、したがって、前記面積比が約９０％以上の着色膜を、前記透過領域の行方向の幅よりも小さい幅と、少なくとも前記透過領域の列方向全長にわたる長さとを有する形状に形成し、この着色膜に対応する透過領域からは、行方向における前記着色膜の側方の領域からだけ非着色光が出射するようにすればよい。

【００３３】一方、前記面積比が小さい着色膜に対応する透過領域は、その領域中に占める非着色光出射領域の面積が大きいため、前記面積比が大きい着色膜に対応する透過領域と同様に、行方向における前記着色膜の側方の領域からだけ非着色光が出射するようにすると、非着色光の出射幅が広くなり過ぎて、この透過領域から出射する着色光と非着色光とにより表示されるカラー画素の彩度が白っぽくなってしまう。

【００３４】しかし、上記のように、前記面積比が小さい着色膜を、前記補償容量電極の延長部の間の領域の幅よりも小さい幅と前記透過領域の列方向長さよりも小さい長さとを有する形状に形成し、この着色膜に対応する透過領域の行方向における前記着色膜の側方の領域および列方向における前記着色膜の側方の領域から非着色光が出射するようにすれば、この透過領域からの非着色光の出射幅を、前記カラー画素の明るさの底上げ効果を充分に発揮するとともに前記カラー画素の彩度が白っぽくなってしまわない範囲にすることができる。

【００３５】そして、いずれの色の着色膜に対応する透過領域においても良好な彩度および明るさのカラー画素を表示することができれば、各色のカラー画素の彩度および明るさをより良くバランスさせ、さらに色再現性の良いカラー画像を表示することができる。

【００３６】なお、前記面積比の大きい着色膜は、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極の延長部との間に間隙を存して設け、この着色膜に対応する透過領域の行方向における前記着色膜の両側の領域から非着色光が出射するようにするのがより好ましく、このようにすることにより、前記面積比の大きい着色膜に対応する透過領域からの出射光により表示されるカラー画素の彩度および明るさを、より良好にすることができる。

【００３７】また、前記面積比の大きい着色膜は、行方向に配列する複数の透過領域にわたって連続するストライプ状に形成してもよく、このようにすることにより、

前記着色膜を容易に形成にすることができる。

【００３８】さらに、前記面積比の小さい着色膜は、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極の延長部との間、および両端縁とこれらの端縁にそれぞれ隣り合う前記補償容量電極のライン部および前記遮光膜との間にそれぞれ間隙を存して設け、この着色膜に対応する透過領域の前記着色膜の周囲の領域から非着色光が出射するようにするのがより好ましく、このようにすることにより、前記面積比の小さい着色膜に対応する透過領域からの出射光により表示されるカラー画素の彩度および明るさを、より良好にすることができる。

【００３９】一方、前記遮光膜は、前記ゲートラインをはさんで列方向に隣り合う一方の画素電極の縁部から他方の画素電極に対向する前記補償容量電極のライン部にわたる領域を覆う幅に形成するのが好ましく、このようにすることにより、前記ゲートラインをはさんで列方向に隣り合う画素電極の間に対応する領域を、前記一方の画素電極の縁部から他方の画素電極の縁部に対向する前記補償容量電極のライン部にわたって遮光してその領域からの光漏れを無くし、よりコントラストの良いカラー画像を表示することができる。

【００４０】また、前記遮光膜は、前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域と、前記データラインをはさんで行方向に隣り合う画素電極間の領域とに対応させて設けてもよく、このようにすることにより、前記列方向および行方向に隣り合う画素電極間の領域のうちの前記遮光膜が対応する領域を暗状態とし、表示画像のコントラストをさらに良くすることができる。

【００４１】この場合、前記遮光膜の前記データラインをはさんで行方向に隣り合う画素電極間の領域に対応する部分を、前記補償容量電極の前記延長部の幅よりも狭く、かつ前記データラインの全幅を覆う幅に形成するのが好ましく、このようにすることにより、前記行方向に隣り合う画素電極間の領域のうちの前記遮光膜に対応しない領域に入射した外光を前記補償容量電極の延長部により反射させて液晶表示素子の前方に出射し、その反射光（非着色光）により画面全体の明るさを底上げすることができる。

【００４２】

【実施例】図１～図５はこの発明の第１の実施例を示しており、図１は液晶表示装置の一部分の正面図、図２は図１のII－II線に沿う拡大断面図、図３は図１のIII－III線に沿う拡大断面図、図４は図１のIV－IV線に沿う拡大断面図、図５は図１のV－V線に沿う拡大断面図である。

【００４３】この実施例の液晶表示装置は、図２～図５に示すように、カラー画像を表示するアクティブマトリックス方式の液晶表示素子１と、この液晶表示素子１の背後に配置された光の反射機能を兼ね備えた照明手段２４とから構成されている。

【００４４】前記アクティブマトリックス液晶表示素子１は、アクティブ素子にＴＦＴ（薄膜トランジスタ）を用いたものであり、図１～図５に示すように、液晶層２１をはさんで対向する前面側および背面側の一対の透明基板２，３のうち、背面側基板３の内面に、行方向（画面の左右方向）および列方向（画面の上下方向）にマトリックス状に配列する複数の透明な画素電極４と、これらの画素電極４にそれぞれ接続された複数のＴＦＴ５と、各行のＴＦＴ５にそれぞれゲート信号を供給する複数のゲートライン１１と、各列のＴＦＴ５にそれぞれデータ信号を供給するデータライン１２と、前記画素電極４の縁部に絶縁膜（ＴＦＴ４のゲート絶縁膜）７を介して対向して前記画素電極４との間に補償容量を形成する補償容量電極１３とが設けられている。

【００４５】前記ＴＦＴ５は、図１に示したように、背面側基板３の内面上に形成されたゲート電極６と、このゲート電極６を覆うゲート絶縁膜７と、前記ゲート絶縁膜７の上に前記ゲート電極６と対向させて形成されたｉ型半導体膜８と、このｉ型半導体膜８の両側部の上にｎ型半導体膜（図示せず）を介して形成されたソース電極９およびドレイン電極１０とからなっている。

【００４６】前記ゲートライン１１は、背面側基板３の内面上に、各画素電極行ごとにその一側に沿わせて配線されており、各行のＴＦＴ５のゲート電極６は、その行に対応するゲートライン１１に一体に形成されている。なお、前記ＴＦＴ５のゲート絶縁膜（透明膜）７は、前記基板３のほぼ全面にわたって形成されており、前記ゲートライン１１は、その端子部を除いてゲート絶縁膜７で覆われている。

【００４７】また、前記データライン１２は、前記ゲート絶縁膜７の上に、各画素電極列ごとにその一側に沿わせて配線されており、各列のＴＦＴ５のドレイン電極１０は、その列に対応するデータライン１２につながっている。

【００４８】なお、この実施例ではデータライン１２をゲート絶縁膜７の上に配線し、各列のＴＦＴ５のドレイン電極１０をそれぞれ、その列に対応するデータライン１２に一体に形成しているが、前記データライン１２は、ＴＦＴ５を層間絶縁膜で覆ってその上に配線し、前記層間絶縁膜に設けたコンタクト孔において前記ＴＦＴ５のドレイン電極１０に接続してもよい。

【００４９】そして、前記画素電極４は前記ゲート絶縁膜７の上に形成されており、これらの画素電極４は、その一側縁の端部において対応するＴＦＴ５のソース電極９に接続されている。

【００５０】また、前記補償容量電極１３は、前記基板３の内面上に、前記各画素電極行ごとに対応させて形成されており、この補償容量電極１３と前記画素電極４の縁部とその間のゲート絶縁膜７とにより、非選択期間の

画素電極４の電位の変動を補償するための補償容量が形成されている。

【００５１】この補償容量電極１３は、行方向に配列する画素電極３の一端縁部に対向するライン部１３ａと、このライン部１３ａから前記データライン１２をはさんで行方向に隣り合う画素電極４，４間の領域に延長されてその両側縁部において行方向に隣り合う前記画素電極４，４の側縁部にそれぞれ対向する延長部１３ｂとを有する形状に形成されており、前記補償容量は、各画素電極４の一端縁部と両側縁部との３つの縁部に対応させて形成されている。

【００５２】なお、この補償容量電極１３のライン部１３ａは、前記画素電極４のＴＦＴ接続側とは反対側の端縁部に対向させて前記ゲートライン１１とほぼ平行に形成され、延長部１３ｂは、前記画素電極４のＴＦＴ接続側の端部近くに達する長さにわたって、その両側縁部が行方向において隣り合う画素電極４，４のそれぞれの側縁部に対向する幅に形成されており、したがって、この延長部１３ｂは、前記隣り合う画素電極４，４間の領域の大部分の長さの領域に、その全幅にわたって対向している。

【００５３】前記補償容量電極１３は、アルミニウム系合金等の低抵抗でかつ光の反射率が高い金属膜により形成されており、前記ゲートライン１１は前記補償容量電極１３と同じ金属膜で形成されている。なお、前記補償容量電極１３とゲートライン１１は、ゲート絶縁膜７の上に形成する画素電極４やデータライン１２との間の絶縁耐圧を高くするため、その表面を陽極酸化処理されている。また、前記データライン１２は、前記補償容量電極１３と同様に、アルミニウム系合金等の低抵抗でかつ光の反射率が高い金属膜により形成されている。

【００５４】さらに、図１では省略しているが、前記背面側基板３の内面には、図２～図５に示すように、前記ＴＦＴ５およびデータライン１２を覆う透明なオーバーコート絶縁膜１４が設けられており、その上に、画素電極４の配列領域全体にわたって配向膜１５が形成されている。

【００５５】一方、前面側の基板２の内面には、前記複数の画素電極４，４の間の領域のうちのゲートライン１１をはさんで列方向に隣り合う画素電極４，４間の領域にそれぞれ対応する遮光膜１６が設けられている。なお、図１では、遮光膜１６を区別しやすくするために、遮光膜部分に平行斜線を施している。

【００５６】前記遮光膜１６は、例えばクロム等の暗色系の金属膜からなっており、この遮光膜１６は、ゲートライン１１をはさんで列方向に隣り合う一方の画素電極４の縁部から他方の画素電極４に対向する前記補償容量電極１３のライン部１３ａにわたる領域を覆う幅に形成されており、前記背面側基板３の内面に設けられた前記補償容量電極１３の延長部１３ｂは、前記遮光膜１６の無い領域全体に対応している。

【００５７】この実施例では、前記遮光膜１６を、その一側縁部（図１において上縁部）が前記一方の画素電極４の端縁部に対向し、他側縁部（図１において下縁部）が前記他方の画素電極４に対向する補償容量電極１３のライン部１３ａの一側部（画素電極４の端縁側の側部）に対向する幅に形成しており、したがって、前記補償容量電極１３のライン部１３ａの他側部（画素電極４の中央側の側部）は、前記遮光膜１６で覆われていない。

【００５８】また、この前面側基板２の内面には、透過波長帯域の異なる複数の色の着色膜、例えば赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂが、前記複数の画素電極４にそれぞれ対応させて行方向に交互に並べて設けられている。なお、図１では、カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂを区別しやすくするために、カラーフィルタ部分に点模様を施している。

【００５９】これらのカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂは、その上に前面側基板２のほぼ全体にわたって設けられた透明な保護絶縁膜１８により覆われており、この保護絶縁膜１８の上に、前記画素電極４の全てに対向する一枚膜状の透明な対向電極１９が設けられ、その上に配向膜２０が形成されている。なお、前記保護絶縁膜１８は、カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの材質を適正に選択することにより省くことができる。

【００６０】上記前面側と背面側の一対の基板２，３は、その周縁部において図示しない枠状シール材を介して接合されており、これらの基板２，３間の前記シール材で囲まれた領域に液晶層２１が設けられている。

【００６１】なお、この液晶表示素子１はＴＮ型のものであり、一対の基板２，３間に設けられた液晶層２１の液晶分子は、前面側基板２の配向膜２１と背面側基板３の配向膜１５とによりそれぞれの基板２，３の近傍における配向方向を規制され、両基板２，３間において所定のツイスト角（例えばほぼ９０°）でツイスト配向しており、また、前記一対の基板２，３の外面にはそれぞれ偏光板２２，２３が、それぞれの透過軸を所定の方向に向けて配置されている。

【００６２】そして、この液晶表示素子１の前記複数の画素電極４にそれぞれ対応する領域のうち、前記補償容量電極１３のライン部１３ａおよび延長部１３ｂと前記遮光膜１６とにより囲まれた領域はそれぞれ、背面側から入射する照明光（照明手段２４からの照明光）および前方から入射し前記照明手段２４により反射される外光を前方に出射する複数の透過領域Ａとなっており、また光の反射率が高い金属膜により形成された前記補償容量電極１３の少なくとも前記延長部１３ｂに対応する領域が、前方から入射する外光を前記補償容量電極１３により反射させて前方に出射する反射領域Ｓとなっている。

【００６３】なお、液晶表示素子１の背面側基板３の内面に設けられたデータライン１２は前記反射領域Ｓ内を

通っているが、このデータライン１２も光の反射率が高い金属膜により形成されているため、前記反射領域Ｓに入射した光のうちの前記データライン１２に対応する部分に入射した光は、前記データライン１２により反射されて前方に出射する。

【００６４】また、この実施例では、前記遮光膜１６を上述したように、その一側縁部がゲートライン１１をはさんで列方向に隣り合う一方の画素電極４の端縁部に対向し、他側縁部が他方の画素電極４に対向する補償容量電極１３のライン部１３ａの一側部に対向する幅に形成しているため、前記補償容量電極１３のライン部１３ａの遮光膜１６で覆われていない他側部（画素電極４の中央側の側部）に対応する領域も、前方から入射する外光を前記補償容量電極１３により反射させて前方に出射する反射領域Ｓとなっている。

【００６５】さらに、この液晶表示素子１はノーマリーホワイトモードのものであり、前記液晶層２１の液晶分子のツイスト角と一対の基板２，３の近傍における配向方向および前面側偏光板２２の透過軸の向きは、液晶表示素子１の前方から入射した光のうちの背面側基板３の内面において前記補償容量電極１３により反射されて液晶表示素子１の前面に出射する光の透過率が、液晶分子が基板２，３面に対して最も倒伏した初期のツイスト配向状態にあるときにほぼ最大となるように設定されており、背面側偏光板２３の透過軸の向きは、前面側偏光板２２の透過軸の向きに応じて、液晶表示素子１にその背面側から入射して前方に出射する前記照明光および液晶表示素子１の前方から入射し前記照明手段２４により反射されて前方に出射する外光の透過率が、液晶分子が初期のツイスト配向状態から基板２，３面に対して立ち上がるように配向するのにともなって低くなるように設定されている。

【００６６】また、前記液晶表示素子１の前面側基板２の内面に設けられた前記赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂはそれぞれ、前記補償容量電極１３のライン部１３ａおよび延長部１３ｂと前記遮光膜１６とにより囲まれた複数の透過領域Ａの面積よりも小さい面積に形成されている。

【００６７】そのため、この液晶表示素子１は、前記複数の透過領域Ａのカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂに対応する領域（以下、フィルタ対応領域という）ａから前記カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの色に着色した赤、緑、青の着色光をそれぞれ出射し、カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂに対応しない領域（以下、無フィルタ領域という）ｂから非着色光をそれぞれ出射するとともに、前記補償容量電極１３の少なくとも前記延長部１３ｂに対応する前記反射領域Ｓから前記補償容量電極１３により反射された非着色光を出射する。

【００６８】さらに、前記赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂは、その透過波長帯域が互いに異なっており、第１の色の着色膜である赤色フィルタ１７Ｒは可視光帯域のうちの長波長帯域の光を透過させ、第２の色の着色膜である緑色フィルタ１７Ｇは中間波長帯域の波長成分の光を透過させ、第３の色の着色膜である青色フィルタ１７Ｂは短波長帯域の波長成分の光を透過させる。

【００６９】そのため、この実施例では、長波長帯域の波長成分の光を透過させる赤色フィルタ１７Ｒを、他の２色のフィルタ１７Ｇ，１７Ｂの面積よりも大きい面積に形成し、前記他の２色のフィルタ１７Ｇ，１７Ｂのうちの中間波長帯域の波長成分の光を透過させる緑色フィルタ１７Ｇを、短波長帯域の波長成分の光を透過させる青色フィルタ１７Ｂの面積よりも小さい面積に形成している。

【００７０】これらのカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂは、前記赤色フィルタ１７Ｒを前記透過領域Ａの面積の９０～９５％の面積、前記緑色フィルタ１７Ｇを前記透過領域Ａの面積の７０～８０％の面積、前記青色フィルタ１７Ｂを前記透過領域Ａの面積の８５～９０％の面積に形成するのが好ましい。

【００７１】この実施例では、前記赤色フィルタ１７Ｒを前記透過領域Ａの面積の９０％の面積に形成し、前記緑色フィルタ１７Ｇを前記透過領域Ａの面積の７０％の面積に形成し、前記青色フィルタ１７Ｂを前記透過領域Ａの面積の８５％の面積に形成している。

【００７２】また、前記複数の画素電極４および透光領域Ａはそれぞれ、行方向の幅よりも列方向の幅が大きい長方形形状に形成されており、したがって、行方向に配列する複数の透過領域Ａのピッチが小さく設定されている。

【００７３】そして、前記赤、緑、青のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂのうち、前記透過領域Ａに対する面積比が所定の値よりも大きいカラーフィルタ、つまり前記透過領域Ａに対する面積比が９０％以上である赤色フィルタ１７Ｒは、前記透過領域Ａの行方向の幅よりも小さい幅と少なくとも前記透過領域Ａの列方向全長にわたる長さとを有する形状に形成されており、それよりも面積比が小さい緑色および青色フィルタ１７Ｇ，１７Ｂはそれぞれ、前記補償容量電極１３の延長部１３ｂの間の領域の幅よりも小さい幅と前記透過領域Ａの列方向長さよりも小さい長さとを有する形状に形成されている。

【００７４】さらに、前記赤色フィルタ１７Ｒは、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極１３の延長部１３ｂとの間にそれぞれ間隙を存して設けられており、したがって、この赤色フィルタ１７Ｒに対応する透過領域Ａは、行方向における前記赤色フィルタ１７Ｒの両側の側方領域がそれぞれ無フィルタ領域ｂであり、この両側の無フィルタ領域ｂからそれぞれ非着色光が出射する。

【００７５】また、前記緑色フィルタ１７Ｇおよび青色フィルタ１７Ｂはそれぞれ、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極１３の延長部１３ｂとの間、および両端縁とこれらの端縁にそれぞれ隣り合う前記補償容量電極１３のライン部１３ａおよび前記遮光膜１６との間にそれぞれ間隙を存して設けられており、したがって、この緑色フィルタ１７Ｇおよび青色フィルタ１７Ｂに対応する透過領域Ａは、前記カラーフィルタ１７Ｇ，１７Ｂの周囲の領域、つまり、透過領域Ａの行方向におけるカラーフィルタ１７Ｇ，１７Ｂの両側の側方領域および列方向におけるカラーフィルタ１７Ｇ，１７Ｂの両端側の側方領域が無フィルタ領域ｂであり、このフィルタ周囲の無フィルタ領域ｂから非着色光が出射する。

【００７６】次に、前記液晶表示素子１の背後に配置された照明手段２４について説明すると、この実施例で用いた照明手段２４は、図２～図５に示すように、照明光を出射する照明パネル２５の前面に半透過反射板２６を配置したものである。

【００７７】前記照明パネル２５は、例えばサイドライト型と呼ばれるものであり、少なくとも一端面を光の入射面とし、前面を前記端面から取り込んだ光の出射面としたアクリル系樹脂等からなる透明な導光板２５ａと、この導光板２５ａの前記端面に対向させて配置された図示しない光源（直管状の蛍光ランプや、複数の発光ダイオードを整列したＬＥＤアレイ等）とから構成されており、前記半透過反射板２６は前記導光板２５ａの前面に配置されている。

【００７８】この液晶表示装置は、充分な明るさの外光が得られるときは前記照明手段２４から照明光を出射させずに外光を利用する反射型表示を行ない、外光の明るさが不足するときに、前記照明手段２４から照明光を出射させて画面輝度を補う２ウエイ表示型のものであり、外光が得られる環境下では、前記液晶表示素子１にその前方から入射する外光のうち、前記複数の画素電極４にそれぞれ対応する領域のうちの前記補償容量電極１３と前記遮光膜１６とにより囲まれた複数の透過領域Ａに入射した光が、この透過領域Ａを透過して液晶表示素子１の背面側に配置された前記照明手段２４の前面の半透過反射板２６により反射され、その反射光が前記液晶表示素子１の各透過領域Ａを透過して液晶表示素子１の前方に出射するとともに、前記補償容量電極１３に対応する反射領域Ｓに入射した光が、液晶表示素子１の背面側基板３の内面において前記補償容量電極１３により反射され、その反射光が液晶表示素子１の前方に出射する。

【００７９】なお、前記反射領域Ｓに入射した光のうち、液晶表示素子１の背面側基板３の内面に設けられたデータライン１２に対応する部分に入射した光は、上述したようにデータライン１２により反射されて前方に出射する。

【００８０】また、前記照明手段２４から照明光を出射させると、その照明光が前記液晶表示素子１にその背面から入射し、その照明光のうち、前記補償容量電極１３および遮光膜１６に対応する領域に入射した光は、この補償容量電極１３および遮光膜１６により遮光され、前記透過領域Ａに入射した光だけが、この透過領域Ａを透過して液晶表示素子１の前方に出射する。

【００８１】そして、この液晶表示装置では、前記赤、緑、青３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂをそれぞれ、前記透過領域Ａの面積よりも小さい面積に形成しているため、外光を利用する反射型表示を行なうときも、また前記照明手段２４から照明光を出射させて画面輝度を補うときも、前記複数の透過領域Ａのフィルタ対応領域ａからそれぞれ、前記カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂによりその吸収波長帯域の波長成分の光を吸収されて前記カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの色に着色した着色光（カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの透過波長帯域の波長成分の光）が出射し、前記複数の透過領域Ａの無フィルタ領域ｂからそれぞれ、前記カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂによる吸収を受けない非着色光が出射する。

【００８２】なお、液晶表示装置の表示を観察する人間の目には、前記透過領域Ａのフィルタ対応領域ａから出射する着色光と、前記無フィルタ領域ｂから出射する無着色光とが混ざって見える。

【００８３】そのため、前記液晶表示素子１の複数の透過領域Ａからそれぞれ出射する光により表示される赤、緑、青の各色のカラー画素は、その透過領域Ａに対応するカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの色に着色し、しかもその明るさを、前記カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂでの吸収による輝度低下のない非着色光により底上げされた画素である。

【００８４】そして、前記複数の透過領域Ａのフィルタ対応領域ａおよび無フィルタ領域ｂから出射する着色光および非着色光の強度は、画素電極４と対向電極１９との間に印加される駆動電界による液晶分子の配向状態の変化に応じて変化し、それにより、複数の透過領域Ａからの出射光により表示される赤、緑、青のカラー画素の明るさが変化して、これらのカラー画素の混色によりフルカラー画像が表示される。

【００８５】したがって、外光を利用する反射型表示を行なうときも、また前記照明手段２４から照明光を出射させて画面輝度を補うときも、前記透過領域Ａの全域からカラーフィルタにより着色された着色光を出射させる場合に比べて、はるかに明るいカラー画像を表示することができる。

【００８６】さらに、この液晶表示装置においては、前記補償容量電極１３を、光の反射率が高い金属膜により、行方向に配列する画素電極４の一端縁部に対向するライン部１３ａと、このライン部１３ａからデータライ

ン１２をはさんで行方向に隣り合う画素電極４、４間の領域に延長されてその両側縁部において行方向に隣り合う画素電極４、４の側縁部にそれぞれ対向する延長部１３ｂとを有する形状に形成しているため、前記液晶表示素子１にその前方から入射した外光のうち、前記補償容量電極１３の少なくとも前記延長部１３ｂに対応する反射領域Ｓに入射した光が、背面側基板３の内面において前記補償容量電極１３により反射され、前記カラーフィルタ１７Ｒ，１７Ｇ，１７Ｂでの吸収による輝度低下がない非着色光のまま液晶表示素子１の前方に出射する。

【００８７】なお、前記補償容量電極１３に対応する反射領域Ｓのうちの画素電極４の縁部に対向する領域（補償容量電極１３の延長部１３ｂの両側縁部に対応する領域）から出射する非着色光の強度は、画素電極４と対向電極１９との間に印加される駆動電界による液晶分子の配向状態の変化に応じて変化する。

【００８８】しかし、前記反射領域Ｓのうちの隣り合う画素電極４，４の間に対応する画素間領域、つまり前記画素電極４と対向電極１９との間に印加される駆動電界が作用しない領域の液晶分子の配向状態は初期配向状態からほとんど変化しないため、前記反射領域Ｓのうちの前記画素間領域に入射した外光の反射率は常に高く保たれる。

【００８９】そのため、外光を利用する反射型表示のときの画面の明るさは、前記複数の透過領域Ａからそれぞれ出射する光（着色光と非着色光）により表示される各色のカラー画素の明るさが、前記透過領域Ａの全域からカラーフィルタにより着色された着色光を出射させる場合に比べてはるかに明るく、しかも、前記補償容量電極１３に対応する反射領域Ｓから出射する非着色の反射光により画面全体の明るさを底上げされた充分な明るさである。

【００９０】したがって、この液晶表示装置によれば、反射型表示による画面の明るさを向上させ、画面輝度を補うために前記照明手段２４から照明光を出射させる頻度を少なくして消費電力を低減することができる。

【００９１】また、この液晶表示装置は、外光の明るさが不足するときに、前記照明手段２４から照明光を出射させて画面輝度を補うものであるが、前記照明手段２４からの照明光のうち、前記補償容量電極１３および遮光膜１６に対応する領域に入射した光はこの補償容量電極１３および遮光膜１６により遮光されるため、前記照明手段２４から照明光を出射させても、前記データライン１２をはさんで行方向に隣り合う画素電極４，４間の領域（補償容量電極１３の延長部１３ｂに対応する領域）から出射する光は、液晶表示素子１の前方から入射した外光の反射光だけであり、そのため、前記照明手段２４から照明光を出射させたときに、前記データライン１２をはさんで行方向に隣り合う画素電極４，４間の領域が明るくなり過ぎて表示画像のコントラストが低下することはない。

【００９２】さらに、前記液晶表示素子１の前面側基板２の内面に設けられた前記遮光膜１６が、前記複数の画素電極４，４の間の領域のうちの少なくとも前記ゲートラインをはさんで列方向に隣り合う画素電極４，４間の領域に対応しているため、この遮光膜１６が対応する画素電極間の領域は、外光を利用する反射型表示を行なうときも、また前記照明手段から照明光を出射させて画面輝度を補うときも暗状態であり、それによっても表示画像のコントラストを良くすることができる。

【００９３】なお、この実施例では、前記遮光膜１６を、ゲートライン１１をはさんで列方向に隣り合う一方の画素電極４の縁部から他方の画素電極４に対向する補償容量電極１３のライン部１３ａにわたる領域を覆う幅に形成しているため、前記ゲートライン１１をはさんで列方向に隣り合う画素電極４，４の間に対応する領域を、前記一方の画素電極４の縁部から他方の画素電極４の縁部に対向する補償容量電極１３のライン部１３ａにわたって遮光してその領域からの光漏れを無くし、よりコントラストの良いカラー画像を表示することができる。

【００９４】しかも、上記実施例においては、前記赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂのうちの長波長帯域の光を透過させる赤色フィルタ１７Ｒを、他の２色のカラーフィルタ（緑色フィルタおよび青色フィルタ）１７Ｇ，１７Ｂの面積よりも大きい面積に形成するとともに、前記他の２色のカラーフィルタ１７Ｇ，１７Ｂ着色膜のうちの中間波長帯域の光を透過させる緑色フィルタ１７Ｇを、短長波長帯域の光を透過させる青色フィルタ１７Ｂの面積よりも小さい面積に形成しているため、前記複数の透過領域Ａからそれぞれ出射する着色光と非着色光とにより表示される各色のカラー画素の彩度および明るさをバランスさせ、色再現性の良いカラー画像を表示することができる。

【００９５】すなわち、一般にカラーフィルタは薄膜化される傾向にあり、カラーフィルタを薄くすれば、このカラーフィルタのよる光の吸収を少なくして出射する着色光の強度を上げることができるが、単にカラーフィルタの膜厚を薄くしたのでは、赤、緑、青のカラーフィルタの平均透過率がそれぞれシフトして、これらのカラーフィルタを透過した各色の光の色バランスが悪くなり、赤、緑、青の光の加法混色による表示色がシアン（青味がかった緑）に近くなるため、良好な白表示が得られない。

【００９６】しかし、この実施例のように、赤、緑、青のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂをそれぞれ上記のように異ならせれば、各透過領域Ａから出射する着色光と非着色光との光量比によって決まるカラー画素の彩度と明るさを、赤、緑、青の各色ごとに調整することができるため、カラーフィルタを薄膜化したときの各色

のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの平均透過率のシフトによる赤、緑、青の着色光の色バランスの悪化を補償することができ、そのため、各透過領域Ａからそれぞれ出射する着色光と非着色光とにより表示される各色のカラー画素の彩度および明るさをバランスさせ、再現性の良いカラー画像を表示することができる。

【００９７】さらに、上記実施例では、前記赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂのうちの長波長帯域の光を透過させる赤色フィルタ１７Ｒを他の２色のカラーフィルタ１７Ｇ，１７Ｂの面積よりも大きい面積に形成し、前記他の２色のカラーフィルタ１７Ｇ，１７Ｂのうちの中間波長帯域の光を透過させる緑色フィルタ１７Ｇを、短波長帯域の光を透過させる青色フィルタ１７Ｂの面積よりも小さい面積に形成しているため、複数の透過領域Ａからそれぞれ出射する着色色と非着色光とにより表示される赤、緑、青の３色のカラー画素の彩度および明るさを良好にバランスさせ、より色再現性の良いカラー画像を表示することができる。

【００９８】なお、上述したように、前記赤、緑、青のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂは、赤色フィルタ１７Ｒを透過領域Ａの面積の９０～９５％の面積、緑色フィルタ１７Ｇを透過領域Ａの面積の７０～８０％の面積、青色フィルタ１７Ｂを前記透過領域Ａの面積の８５～９０％の面積に形成するのが好ましく、例えば上記のように、赤色フィルタ１７Ｒを透過領域Ａの面積の９０％の面積に形成し、緑色フィルタ１７Ｇを透過領域Ａの面積の７０％の面積に形成し、青色フィルタ１７Ｂを透過領域Ａの面積の８５％の面積に形成すれば、赤、緑、青の各色のカラー画素の彩度および明るさのバランスが良い、色再現性の高いカラー画像を表示することができる。

【００９９】さらに、上記実施例では、前記複数の画素電極４および透光領域Ａをそれぞれ、行方向の幅よりも列方向の幅が大きい長方形形状に形成することにより、行方向に配列する複数の透過領域Ａのピッチを小さく設定しているため、行方向に配列する複数の透過領域Ａから赤、緑、青の着色光を小さいピッチで交互に出射してそれらの混色を良好にし、高い解像度のカラー画像を表示することができる。

【０１００】そして、上記実施例では、前記長方形形状に形成された複数の透過領域Ａにそれぞれ対応する赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂのうち、前記透過領域Ａに対する面積比が所定の値よりも大きい赤色フィルタ１７Ｒ着色膜を、前記透過領域Ａの行方向の幅よりも小さい幅と少なくとも前記透過領域Ａの列方向全長にわたる長さとを有する形状に形成し、それよりも面積比が小さい緑色および青色フィルタ１７Ｇ，１７Ｂを、前記補償容量電極１３の延長部１３ｂの間の領域の幅よりも小さい幅と前記透過領域Ａの列方向長さよりも小さい長さとを有する形状に形成することにより、前記面積比の大きい赤色フィルタ１７Ｒに対応する透過領域Ａの行方向における前記フィルタ１７Ｒの側方の領域から非着色光が出射し、前記面積比の小さい緑色および青色フィルタ１７Ｇ，１７Ｂにそれぞれ対応する透過領域Ａの行方向における前記フィルタ１７Ｇ，１７Ｂの側方の領域および列方向における前記フィルタ１７Ｇ，１７Ｂの側方の領域から非着色光が出射するようにするのが好ましく、このようにすることにより、複数の透過領域Ａからそれぞれ出射する着色光と非着色光とにより表示される各色のカラー画素の彩度および明るさをより良くバランスさせ、さらに色再現性の良いカラー画像を表示することができる。

【０１０１】すなわち、前記面積比が大きい赤色フィルタ１７Ｒに対応する透過領域Ａは、その領域Ａ中に占める非着色光出射領域の面積（無フィルタ領域ｂの面積）が小さいため、この透過領域Ａにおいても前記フィルタ１７Ｒの側方の領域および列方向における前記フィルタ１７Ｒの側方の領域の両方から非着色光を出射させるようにすると、非着色光の出射幅がかなり狭くなり、この透過領域Ａから出射する着色光と非着色光とにより表示されるカラー画素の明るさの底上げ効果が充分に発揮されなくなって、前記カラー画素の彩度が黒っぽくなってしまう。

【０１０２】しかし、上記のように、前記面積比が所定の値よりも大きい赤色フィルタ１７Ｒを、前記透過領域Ａの行方向の幅よりも小さい幅と、少なくとも前記透過領域Ａの列方向全長にわたる長さとを有する形状に形成し、この赤色フィルタ１７Ｒに対応する透過領域Ａからは、行方向における前記フィルタ１７Ｒの側方の領域からだけ非着色光が出射するようにすれば、この透過領域Ａからも非着色光を充分な幅で出射させ、前記カラー画素の明るさの底上げ効果を充分に発揮して、良好な彩度および明るさのカラー画素を表示することができる。

【０１０３】なお、行方向におけるカラーフィルタの側方の領域および列方向におけるカラーフィルタの側方の領域の両方から非着色光を出射させるようにすると非着色光の出射領域の幅がかなり狭くなってカラー画素の明るさの底上げ効果が充分に発揮されなくなる透過領域Ａは、前記面積比が約９０％以上のカラーフィルタに対応する透過領域である。

【０１０４】したがって、上記のように赤色フィルタ１７Ｒを透過領域Ａの面積の９０％の面積に形成し、緑色フィルタ１７Ｇを透過領域Ａの面積の７０％の面積に形成し、青色フィルタ１７Ｂを透過領域Ａの面積の８５％の面積に形成する場合は、前記面積比が約９０％以上である赤色フィルタ１７Ｒを、前記透過領域Ａの行方向の幅よりも小さい幅と、少なくとも前記透過領域Ａの列方向全長にわたる長さとを有する形状に形成し、この赤色フィルタ１７Ｒに対応する透過領域Ａからは、行方向における前記フィルタ１７Ｒの側方の領域からだけ非着色

光が出射するようにすればよい。

【０１０５】一方、前記面積比が小さい緑色および青色フィルタ１７Ｇ，１７Ｂにそれぞれ対応する透過領域Ａは、その領域Ａ中に占める非着色光出射領域の面積（無フィルタ領域ｂの面積）が大きいため、前記面積比が大きい赤色フィルタ１７Ｒに対応する透過領域と同様に、行方向における側方の領域からだけ非着色光が出射するようにすると、非着色光の出射幅が広くなり過ぎて、この透過領域Ａから出射する着色光と非着色光とにより表示されるカラー画素の彩度が白っぽくなってしまう。

【０１０６】しかし、上記のように、前記面積比が小さい緑色および青色フィルタ１７Ｇ，１７Ｂをそれぞれ、前記補償容量電極１３の延長部１３ｂの間の領域の幅よりも小さい幅と前記透過領域Ａの列方向長さよりも小さい長さとを有する形状に形成し、この緑色および青色フィルタ１７Ｇ，１７Ｂにそれぞれ対応する透過領域Ａの行方向における前記フィルタ１７Ｇ，１７Ｂの側方の領域および列方向における前記フィルタ１７Ｇ，１７Ｂの側方の領域から非着色光が出射するようにすれば、この透過領域Ａからの非着色光の出射幅を、前記カラー画素の明るさの底上げ効果を充分に発揮するとともに前記カラー画素の彩度が白っぽくなってしまわない範囲にすることができる。

【０１０７】そして、いずれの色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂに対応する透過領域Ａにおいても良好な彩度および明るさのカラー画素を表示することができれば、各色のカラー画素の彩度および明るさをより良くバランスさせ、さらに色再現性の良いカラー画像を表示することができる。

【０１０８】なお、前記面積比の大きい赤色フィルタ１７Ｒに対応する透過領域Ａは、前記赤色フィルタ１７Ｒの両側の領域のうちのいずれか一方からだけ非着色光を出射する構成としてもよいが、上記実施例のように、前記赤色フィルタ１７Ｒを、その両側縁とこれらの側縁にそれぞれ隣り合う補償容量電極１３の延長部１３ｂとの間に間隙を存して設け、この赤色フィルタ１７Ｒに対応する透過領域Ａの行方向における前記フィルタ１７Ｒの両側の領域から非着色光が出射するようにするのがより好ましく、このようにすることにより、前記赤色フィルタ１７Ｒに対応する透過領域Ａからの出射光により表示されるカラー画素の彩度および明るさを、より良好にすることができる。

【０１０９】また、前記面積比の小さい緑色および青色フィルタ１７Ｇ，１７Ｂに対応する透過領域Ａはそれぞれ、前記緑色および青色フィルタ１７Ｇ，１７Ｂの両側の領域のうちのいずれか一方と、両端側の領域のうちのいずれか一方からだけ非着色光を出射する構成としてもよいが、上記実施例のように、前記緑色および青色フィルタ１７Ｇ，１７Ｂをそれぞれ、その両側縁とこれらの側縁にそれぞれ隣り合う補償容量電極１３の延長部との間、および両端縁とこれらの端縁にそれぞれ隣り合う前記補償容量電極１３のライン部１３ａおよび前記遮光膜１６との間にそれぞれ間隙を存して設け、この緑色および青色フィルタ１７Ｇ，１７Ｂに対応する透過領域Ａの前記フィルタ１７Ｇ，１７Ｂの周囲の領域から非着色光が出射するようにするのがより好ましく、このようにすることにより、前記緑色および青色フィルタ１７Ｇ，１７Ｂに対応する透過領域Ａからの出射光により表示されるカラー画素の彩度および明るさを、より良好にすることができる。

【０１１０】なお、上記実施例では、長波長帯域の光を透過させる赤色フィルタ１７Ｒを透過領域Ａの面積の９０％の面積に形成し、中間波長帯域の光を透過させる緑色フィルタ１７Ｇを透過領域Ａの面積の７０％の面積に形成し、短波長帯域の光を透過させる青色フィルタ１７Ｂを透過領域Ａの面積の８５％の面積に形成しているが、これらのカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂの透過領域Ａに対する好ましい面積比は、上述したように、赤色フィルタ１７Ｒで９０～９５％、緑色フィルタ１７Ｇで７０～８０％、青色フィルタ１７Ｂで８５～９０％であり、例えば赤色フィルタ１７Ｒを透過領域Ａの面積の９５％の面積に形成し、緑色フィルタ１７Ｇを透過領域Ａの面積の８０％の面積に形成し、青色フィルタ１７Ｂを透過領域Ａの面積の９０％の面積に形成しても、赤、緑、青の各色のカラー画素の彩度および明るさのバランスが良い、色再現性の高いカラー画像を表示することができる。

【０１１１】なお、上述したように、行方向におけるカラーフィルタの側方の領域および列方向におけるカラーフィルタの側方の領域の両方から非着色光を出射させるようにすると非着色光の出射領域の幅がかなり狭くなってカラー画素の明るさの底上げ効果が充分に発揮されなくなる透過領域は、透過領域Ａに対する面積比が約９０％以上のカラーフィルタに対応する透過領域であるため、上記のように赤色フィルタ１７Ｒの面積比を９５％、緑色フィルタ１７Ｇの面積比を８０％、青色フィルタ１７Ｂの面積比を９０％とする場合は、前記面積比が約９０％以上の赤色フィルタ１７Ｒと青色フィルタ１７Ｂとを、前記透過領域Ａの行方向の幅よりも小さい幅と、少なくとも前記透過領域Ａの列方向全長にわたる長さとを有する形状に形成し、この赤色フィルタ１７Ｒおよび青色フィルタ１７Ｂに対応する透過領域Ａからは、行方向における前記フィルタ１７Ｒ，１７Ｂの側方の領域からだけ非着色光が出射するようにするのが好ましい。

【０１１２】また、上記実施例では、赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂを、行方向および列方向にマトリックス状に配列する複数の画素電極４にそれぞれ対応させて設けているが、これらのカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂのうちの前記透過領域

Ａに対する面積比の大きいカラーフィルタ（上記実施例では赤色フィルタ１７Ｒ）は、行方向に配列する複数の透過領域Ａにわたって連続するストライプ状に形成してもよい。

【０１１３】図６はこの発明の第２の実施例を示す液晶表示装置の一部分の正面図であり、この実施例は、赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂのうちの赤色フィルタ１７Ｒを、行方向に配列する複数の透過領域Ａにわたって連続するストライプ状に形成したものである。

【０１１４】なお、この実施例の液晶表示装置は、前記赤色フィルタ１７Ｒをストライプ状に形成しているが、他の構成は図１～図５に示した第１の実施例の液晶表示装置と同じであるから、重複する説明は図に同符号を付して省略する。

【０１１５】この実施例によれば、赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂのうちの透過領域Ａに対する面積比の大きいカラーフィルタ、つまり透過領域Ａの行方向の幅よりも小さい幅と、少なくとも前記透過領域Ａの列方向全長にわたる長さとを有する形状に形成する赤色フィルタ１７Ｒを、行方向に配列する複数の透過領域Ａにわたって連続する単純なアストライプ状に形成しているため、前記赤色フィルタ１７Ｒを容易に形成することができる。

【０１１６】図７および図８はこの発明の第３の実施例を示しており、図７は液晶表示装置の一部分の正面図、図８は図７のVIII－VIII線に沿う拡大断面図である。

【０１１７】この実施例の液晶表示装置は、液晶表示素子１の前面側基板２の内面に設けられた遮光膜１６を、ゲートライン１１をはさんで列方向に隣り合う画素電極４，４間の領域と、データライン１２をはさんで行方向に隣り合う画素電極４，４間の領域とに対応させて設けたものであり、前記遮光膜１６の前記データライン１２をはさんで行方向に隣り合う画素電極４，４間の領域に対応する部分は、補償容量電極１３の延長部１３ｂの幅よりも狭く、かつ前記データライン１２の全幅を覆う幅に形成されている。

【０１１８】なお、この実施例の液晶表示装置は、前記遮光膜１６を、データライン１２をはさんで行方向に隣り合う画素電極４，４間の領域にも対応させて設けているが、他の構成は図１～図５に示した第１の実施例の液晶表示装置と同じであるから、重複する説明は図に同符号を付して省略する。

【０１１９】この実施例によれば、列方向および行方向に隣り合う画素電極４，４間の領域のうちの前記遮光膜１６が対応する領域を暗状態とし、表示画像のコントラストをさらに良くすることができる。

【０１２０】しかも、この実施例では、前記遮光膜１６のデータライン１２をはさんで行方向に隣り合う画素電極４，４間の領域に対応する部分を、補償容量電極１３の延長部１３ｂの幅よりも狭く、かつ前記データライン１２の全幅を覆う幅に形成しているため、行方向に隣り合う画素電極４，４間の領域のうちの前記遮光膜１６に対応しない領域に入射した外光を前記補償容量電極１３の延長部１３ｂにより反射させて液晶表示素子１の前方に出射し、その反射光（非着色光）により画面全体の明るさを底上げすることができる。

【０１２１】なお、上記各実施例で用いた液晶表示素子１は、補償容量電極１３をゲートライン１１とは別に設けることにより、いわゆる蓄積容量方式の補償容量を形成したものであるが、前記補償容量は、前記補償容量電極１３を前記ゲートライン１１と一体の電極とした、いわゆる付加容量方式としてもよい。

【０１２２】また、上記液晶表示素子１は、行方向に赤、緑、青のカラー画素を表示するための透過領域Ａが交互に並んで直線的に配列し、列方向に同じ色のカラー画素を表示するための透過領域Ａが直線的に配列したタイプのものであるが、前記液晶表示素子１は、各画素電極および各色のカラーフィルタを、行方向に赤、緑、青のカラー画素を表示するための透過領域Ａが交互に並んで直線的に配列し、列方向には同色のカラー画素を表示するための透過領域Ａが約１．５ピッチずつ行方向に交互にずれてジグザグに配列した、いわゆるデルタ配列（モザイク配列とも言う）タイプのものでもよい。

【０１２３】さらに、上記実施例では、液晶表示素子１の背後に配置する照明手段２４として、サイドライト型照明パネル２５の前面に半透過反射板２６を配置したものを用いたが、液晶表示素子１の背後に配置する照明手段は、例えば特願平９－３５３６０３号、特願平１０－１２０９７８号の明細書および図面に記載されているような、前面を階段形状面に形成するとともにその複数の段面にそれぞれ反射膜を形成した導光体を用い、光源からの照明光を前記導光体の端面から取り込んで前記階段形状面の複数の段差面から出射し、前方から入射する外光を前記階段形状面の複数の段面上の反射膜により反射させる構成のものを用いてもよい。

【０１２４】この構成の照明手段は、理論的には光源からの光を１００％出射し、前方からの入射光を１００％反射するため、この照明手段を用いれば、その光源の発光輝度を比較的低く設定し、より消費電力を少なくするとともに、外光を利用する反射型表示を、上記実施例の液晶表示装置よりもさらに明るくすることができる。

【０１２５】さらに、上記実施例で用いた液晶表示素子１は、着色膜として、赤、緑、青の３色のカラーフィルタ１７Ｒ，１７Ｇ，１７Ｂを備えたものであるが、前記着色膜は、例えばマゼンタ、イエロー、シアンの３色のカラーフィルタでもよく、また、前記着色膜は、液晶表示素子１の背面側基板３の内面に設けてもよい。

【０１２６】

【発明の効果】この発明の液晶表示装置は、アクティブ

マトリックス方式の液晶表示素子と、前記液晶表示素子の背後に配置され、照明光を前記液晶表示素子に向けて出射するとともに、前記液晶表示素子の前方から入射する外光を前記液晶表示素子に向けて反射する照明手段とを備え、前記液晶表示素子の背面側基板の内面に設けられた補償容量電極を、高い光反射率を有する金属膜により、行方向に配列する画素電極の一端縁部に対向するライン部と、このライン部からデータラインをはさんで行方向に隣り合う画素電極間の領域に延長されてその両側縁部において行方向に隣り合う前記画素電極の側縁部にそれぞれ対向する延長部とを有する形状に形成し、複数の画素電極にそれぞれ対応する領域のうちの前記補償容量電極と、前記複数の画素電極の間の領域のうちの少なくとも前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域に対応させて前面側基板の内面に設けられた遮光膜とにより囲まれた領域をそれぞれ、背面側から入射する前記照明光および前方から入射し前記照明手段により反射される外光を前方に出射する複数の透過領域とし、前記補償容量電極の少なくとも前記延長部に対応する領域を、前方から入射する外光を前記補償容量電極により反射させて前方に出射する反射領域とするとともに、いずれか一方の内面に前記複数の画素電極にそれぞれ対応させて設けられた複数の色の着色膜の面積を前記透過領域の面積よりも小さくし、前記複数の透過領域の前記着色膜に対応する領域からそれぞれ着色光が出射し、前記着色膜に対応しない領域からそれぞれ非着色光が出射し、前記補償容量電極の少なくとも前記延長部に対応する前記反射領域から前記補償容量電極により反射された非着色光が出射するようにしたものであるため、反射型表示による画面の明るさを向上させ、画面輝度を補うために前記照明手段から照明光を出射させる頻度を少なくして消費電力を低減するとともに、充分な明るさでコントラストの良いカラー画像を表示することができる。

【０１２７】この発明の液晶表示装置において、前記複数の色の着色膜が、可視光帯域のうちの長波長帯域の光を透過させる第１の色の着色膜と、中間波長帯域の波長成分の光を透過させる第２の色の着色膜と、短波長帯域の波長成分の光を透過させる第３の色の着色膜との３色の着色膜である場合は、前記第１の色の着色膜を他の２色の着色膜の面積よりも大きい面積に形成し、前記他の２色の着色膜のうちの前記第２の色の着色膜を前記第３の色の着色膜の面積よりも小さい面積に形成するのが望ましく、このようにすることにより、前記複数の透過領域からそれぞれ出射する着色光と非着色光とにより表示される各色のカラー画素の彩度および明るさをバランスさせ、色再現性の良いカラー画像を表示することができる。

【０１２８】その場合、例えば前記第１の色の着色膜が赤色フィルタ、前記第２の色の着色膜が緑色フィルタ、前記第３の色の着色膜が青色フィルタであるときは、前記赤色フィルタを前記透過領域の面積の９０～９５％の面積に形成し、前記緑色フィルタを前記透過領域の面積の７０～８０％の面積に形成し、前記青色フィルタを前記透過領域の面積の８５～９０％の面積に形成するのが好ましく、このようにすることにより、赤、緑、青の各色のカラー画素の彩度および明るさのバランスが良い、色再現性の高いカラー画像を表示することができる。

【０１２９】さらに、前記複数の画素電極および透光領域はそれぞれ、行方向の幅よりも列方向の幅が大きい長方形形状に形成するのが望ましく、このようにすることにより、行方向に配列する複数の透過領域から複数の色の着色光を小さいピッチで交互に出射してそれらの混色を良好にし、高い解像度のカラー画像を表示することができる。

【０１３０】このように前記透光領域を行方向の幅よりも列方向の幅が大きい長方形形状に形成する場合は、前記３色の着色膜のうち、前記透過領域に対する面積比が所定の値よりも大きい着色膜を、前記透過領域の行方向の幅よりも小さい幅と少なくとも前記透過領域の列方向全長にわたる長さとを有する形状に形成し、それよりも面積比が小さい着色膜を、前記補償容量電極の延長部の間の領域の幅よりも小さい幅と前記透過領域の列方向長さよりも小さい長さとを有する形状に形成することにより、前記面積比の大きい着色膜に対応する透過領域の行方向における前記着色膜の側方の領域から非着色光が出射し、前記面積比の小さい着色膜に対応する透過領域の行方向における前記着色膜の側方の領域および列方向における前記着色膜の側方の領域から非着色光が出射するようにするのが好ましく、このようにすることにより、複数の透過領域からそれぞれ出射する着色光と非着色光とにより表示される各色のカラー画素の彩度および明るさをより良くバランスさせ、さらに色再現性の良いカラー画像を表示することができる。

【０１３１】この場合は、前記透過領域に対する面積比が約９０％以上の着色膜を、前記透過領域の行方向の幅よりも小さい幅と、少なくとも前記透過領域の列方向全長にわたる長さとを有する形状に形成し、この着色膜に対応する透過領域からは、行方向における前記着色膜の側方の領域からだけ非着色光が出射するようにすればよい。

【０１３２】そして、いずれの色の着色膜に対応する透過領域においても良好な彩度および明るさのカラー画素を表示することができれば、各色のカラー画素の彩度および明るさをより良くバランスさせ、さらに色再現性の良いカラー画像を表示することができる。

【０１３３】前記面積比の大きい着色膜は、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極の延長部との間に間隙を存して設け、この着色膜に対応する透過領域の行方向における前記着色膜の両側の領域か

ら非着色光が出射するようにするのがより好ましく、このようにすることにより、前記面積比の大きい着色膜に対応する透過領域からの出射光により表示されるカラー画素の彩度および明るさを、より良好にすることができる。

【０１３４】また、前記面積比の大きい着色膜は、行方向に配列する複数の透過領域にわたって連続するストライプ状に形成してもよく、このようにすることにより、前記着色膜を容易に形成にすることができる。

【０１３５】前記面積比の小さい着色膜は、その両側縁とこれらの側縁にそれぞれ隣り合う前記補償容量電極の延長部との間、および両端縁とこれらの端縁にそれぞれ隣り合う前記補償容量電極のライン部および前記遮光膜との間にそれぞれ間隙を存して設け、この着色膜に対応する透過領域の前記着色膜の周囲の領域から非着色光が出射するようにするのがより好ましく、このようにすることにより、前記面積比の小さい着色膜に対応する透過領域からの出射光により表示されるカラー画素の彩度および明るさを、より良好にすることができる。

【０１３６】一方、前記遮光膜は、前記ゲートラインをはさんで列方向に隣り合う一方の画素電極の縁部から他方の画素電極に対向する前記補償容量電極のライン部にわたる領域を覆う幅に形成するのが好ましく、このようにすることにより、前記ゲートラインをはさんで列方向に隣り合う画素電極の間に対応する領域を、前記一方の画素電極の縁部から他方の画素電極の縁部に対向する前記補償容量電極のライン部にわたって遮光してその領域からの光漏れを無くし、よりコントラストの良いカラー画像を表示することができる。

【０１３７】また、前記遮光膜は、前記ゲートラインをはさんで列方向に隣り合う画素電極間の領域と、前記データラインをはさんで行方向に隣り合う画素電極間の領域とに対応させて設けてもよく、このようにすることにより、前記列方向および行方向に隣り合う画素電極間の領域のうちの前記遮光膜が対応する領域を暗状態とし、表示画像のコントラストをさらに良くすることができる。

【０１３８】この場合、前記遮光膜の前記データラインをはさんで行方向に隣り合う画素電極間の領域に対応する部分を、前記補償容量電極の前記延長部の幅よりも狭く、かつ前記データラインの全幅を覆う幅に形成するのが好ましく、このようにすることにより、前記行方向に隣り合う画素電極間の領域のうちの前記遮光膜に対応しない領域に入射した外光を前記補償容量電極の延長部により反射させて液晶表示素子の前方に出射し、その反射光（非着色光）により画面全体の明るさを底上げすることができる。

【図面の簡単な説明】

【図１】この発明の第１の実施例を示す液晶表示装置の一部分の正面図。

【図２】図１のII－II線に沿う拡大断面図。

【図３】図１の III－III 線に沿う拡大断面図。

【図４】図１のIV－IV線に沿う拡大断面図。

【図５】図１の V－V 線に沿う拡大断面図。

【図６】この発明の第２の実施例を示す液晶表示装置の一部分の正面図。

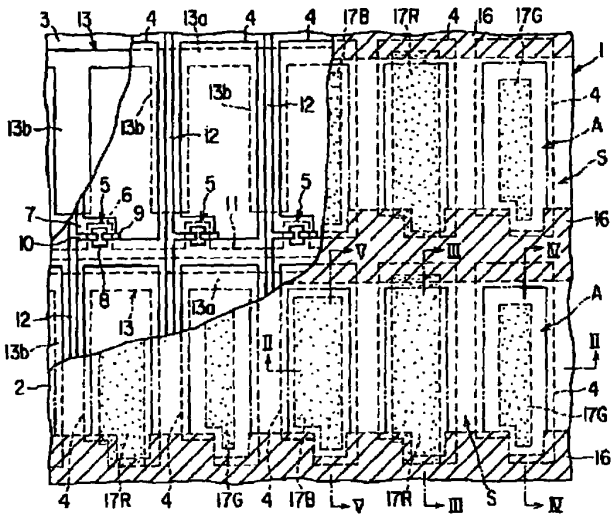
【図７】この発明の第３の実施例を示す液晶表示装置の一部分の正面図

【図８】図７のVIII－VIII線に沿う拡大断面図。

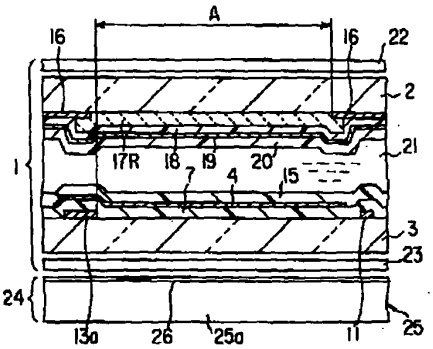
【符号の説明】

１…液晶表示素子
２，３…基板
４…画素電極
５…ＴＦＴ
１１…ゲートライン
１２…データライン
１３…補償容量電極
１３ａ…ライン部
１３ｂ…延長部
１６…遮光膜
１７Ｒ，１７Ｇ，１７Ｂ…カラーフィルタ
１９…対向電極
２２，２３…偏光板
Ａ…透過領域
Ｓ…反射領域
２４…照明手段
２５…照明パネル
２６…半透過反射板

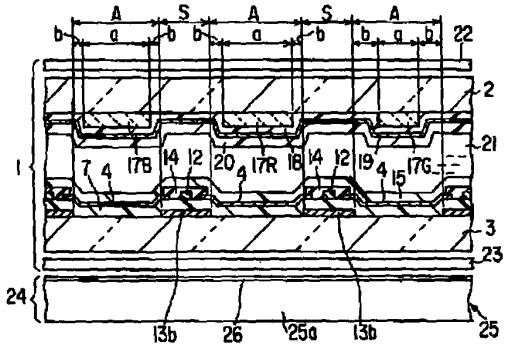
【図１】



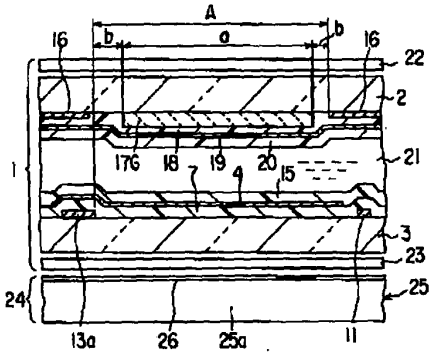
【図３】



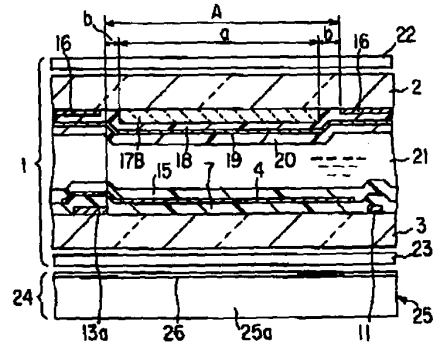
【図２】



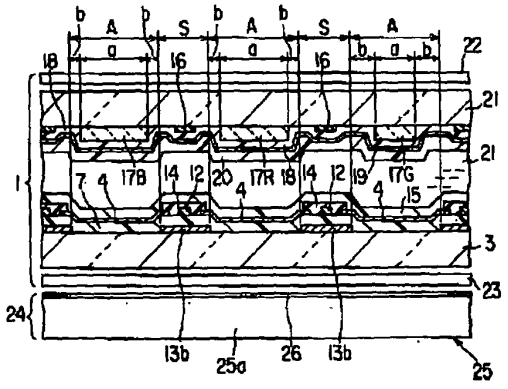
【図４】



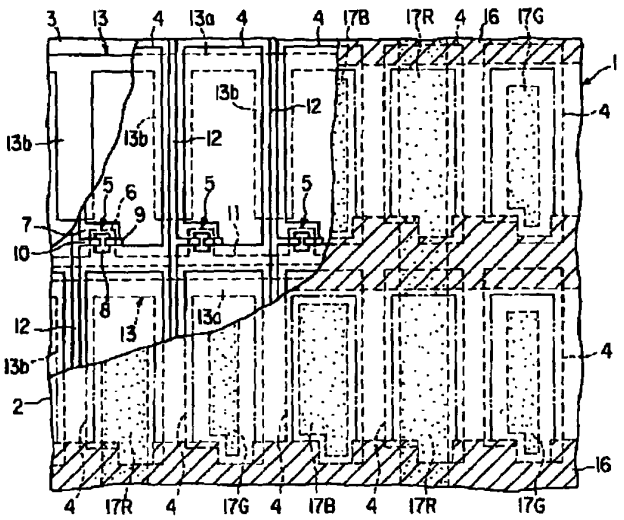
【図５】



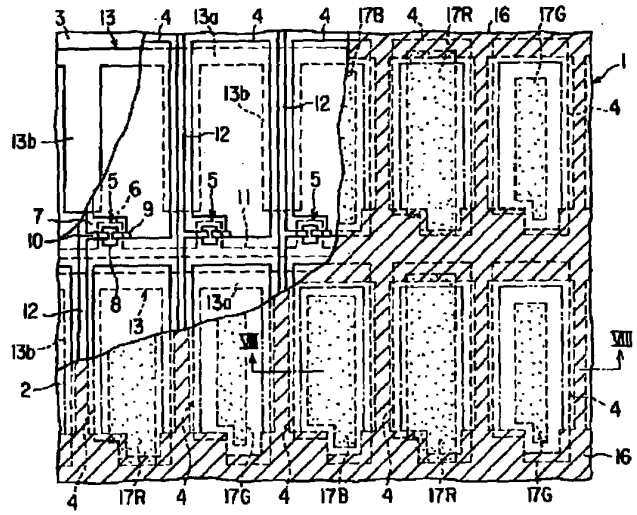
【図８】



【図６】



【図７】



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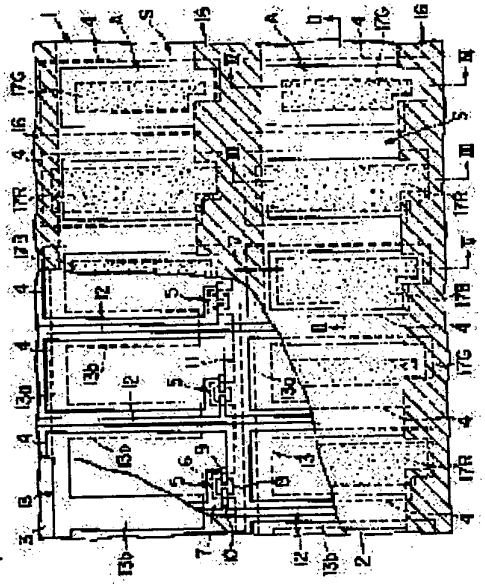
(54) LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a two-way display type liquid crystal display device capable of improving brightness on the screen through reflective display, reducing power consumption by reducing the emitting frequency of illuminating light for supplementing the screen brightness and displaying a color image with sufficient brightness and good contrast.
SOLUTION: A compensating capacity electrode 13, which is provided on the rear side inner surface of a substrate 3 in a liquid crystal display element 1, is formed into a shape, which has an extension 13b corresponding to the area between pixel electrodes adjacent with a data line 12 held in between, by means of a metal film of a high reflectivity. Among the areas corresponding to the pixel electrodes 4, an area enclosed by the compensating capacity electrode 13 and a light-shielding film 16, which corresponds to the area between the pixel electrodes adjacent with a gate line 11 held in between, is made a transmitting area A, while an area corresponding to the extension 13b of the compensating capacity electrode 13 is made a reflection area S. Also the areas for color filters 17R, 17G, 17B are made smaller than that of the transmitting area A, which emits coloring light and non-colored light from the transmitting area A, and emitting non-colored reflected light from the reflection area S.



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CLAIMS

[Claim(s)]
[Claim 1] It is formed in the configuration characterized by providing the following, and the field surrounded with the aforementioned compensation-capacitance electrode of the fields corresponding to two or more aforementioned pixel electrodes and the aforementioned shading film, respectively, respectively They are two or more transparency fields which carry out outgoing radiation of the outdoor daylight which carries out incidence from the aforementioned lighting light which carries out incidence from a tooth-back side, and the front, and is reflected by the aforementioned lighting means ahead. While the field corresponding to the aforementioned extension of the aforementioned compensation-capacitance electrode is the reflective field which is made to reflect the outdoor daylight which carries out incidence from the front by the aforementioned compensation-capacitance electrode, and carries out outgoing radiation ahead at least The coloring film of two or more aforementioned colors has an area smaller than the area of the aforementioned transparency field, respectively. Coloring light carries out outgoing radiation, respectively from the field corresponding to the aforementioned coloring film of two or more aforementioned transparency fields. The liquid crystal display which a non-coloring light carries out outgoing radiation from the field which does not correspond to the aforementioned coloring film, respectively, and is characterized by a non-coloring light reflected by the aforementioned compensation-capacitance electrode carrying out outgoing radiation from the reflective aforementioned field corresponding to the aforementioned extension at least of the aforementioned compensation-capacitance electrode. The liquid crystal display element of an active matrix method. While being arranged behind the aforementioned liquid crystal display element and turning and carrying out outgoing radiation of the lighting light to the aforementioned liquid crystal display element It has a lighting means to turn to the aforementioned liquid crystal display element the outdoor daylight which carries out incidence, and to reflect from the front of the aforementioned liquid crystal display element. Two or more pixel electrodes arranged in the shape of a matrix in a line writing direction and the direction of a train to the inside of the tooth-back side substrate of the substrates of the couple by the side of the front face which counters on both sides of the liquid crystal layer of the aforementioned liquid crystal display element, and a tooth back. Two or more TFT connected to each of this pixel electrode, respectively. The gate line which is made to meet the unilateral for every pixel electrode line, and it wires, and supplies a gate signal to the aforementioned TFT, The data line which is made to meet the unilateral for every pixel electrode train, and it wires, and supplies a data signal to the aforementioned TFT, The counterelectrode which the compensation-capacitance electrode which is formed for every aforementioned pixel electrode line, counters the marginal part of the aforementioned pixel electrode through an insulator layer, and forms a compensation capacitance between the aforementioned pixel electrodes is prepared, and counters the inside of a front-face side substrate at each aforementioned pixel electrode, The shading film corresponding to the pixel inter-electrode field of the fields between two or more aforementioned pixel electrodes which adjoins each other in the direction of a train on both sides of the aforementioned gate line at least is prepared. Make two or more aforementioned pixel electrodes correspond, respectively, and the coloring film of two or more colors with which transmitted wave length bands differ arranges to one inside of the substrates of the aforementioned couple by turns, and is prepared in it at the line writing direction, and the aforementioned compensation-capacitance electrode by the metal membrane with the high reflection factor of light The extension which counters the side edge section of the aforementioned pixel electrode which is extended to the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line from the line section which counters the end marginal part of the aforementioned pixel electrode arranged to a line writing direction, and this line section, and adjoins a line writing direction in the edges-on-both-sides section, respectively.
[Claim 2] The coloring film of the 1st color with which the coloring film of two or more aforementioned colors makes the light of the long-wavelength-region region of the visible light-pattern regions penetrate, It is the coloring film of three colors of the coloring film of the 2nd color which makes the light of an elliptic-trochoidal-wave length band

penetrate, and the coloring film of the 3rd color which makes the light of a short-wavelength-region region penetrate. The liquid crystal display according to claim 1 characterized by having area with the larger coloring film of the 1st color of the above than the area of the coloring film of other two colors, and the coloring film of the 2nd color of the above of the coloring films of two colors besides the above having an area smaller than the area of the coloring film of the 3rd color of the above.

[Claim 3] The coloring film of the 1st color of the above a red filter and the coloring film of the 2nd color of the above A green filter, The coloring film of the 3rd color of the above is a blue filter, and the aforementioned red filter has 90 - 95% of area of the area of the aforementioned transparency field. The liquid crystal display according to claim 3 characterized by for the aforementioned green filter having 70 - 80% of area of the area of the aforementioned transparency field, and the aforementioned blue filter having 85 - 90% of area of the area of the aforementioned transparency field.

[Claim 4] The liquid crystal display according to claim 2 or 3 characterized by forming the pixel electrode and light transmission field of the aforementioned plurality in the rectangle configuration where the width of face of the direction of a train is larger than the width of face of a line writing direction, respectively.

[Claim 5] It is formed in the configuration characterized by providing the following, and a non-coloring light carries out outgoing radiation from the field of the side of the aforementioned coloring film in the line writing direction of the transparency field corresponding to the large coloring film of the aforementioned surface ratio. The liquid crystal display according to claim 4 characterized by a non-coloring light carrying out outgoing radiation from the field of the side of the aforementioned coloring film in the line writing direction of the transparency field corresponding to the small coloring film of the aforementioned surface ratio, and the field of the side of the aforementioned coloring film in the direction of a train. Width of face with the coloring film smaller than the width of face of the line writing direction of the aforementioned transparency field with the larger surface ratio to the aforementioned transparency field among the coloring films of the three aforementioned color than a predetermined value. Width of face with a coloring film smaller than the width of face of the field between the extensions of the aforementioned compensation-capacitance electrode with surface ratio it is formed in the configuration which has the length covering the direction overall length of a train of the aforementioned transparency field at least, and smaller than it. Length smaller than the direction length of a train of the aforementioned transparency field.

[Claim 6] The liquid crystal display according to claim 5 with which surface ratio to the aforementioned transparency field is characterized by being formed in the configuration in which about 90% or more of coloring film has width of face smaller than the width of face of the line writing direction of the aforementioned transparency field, and the length covering the direction overall length of a train of the aforementioned transparency field at least.

[Claim 7] The large coloring film of the aforementioned surface ratio is a liquid crystal display according to claim 5 characterized by being consisted and prepared between the extensions of the aforementioned compensation-capacitance electrode which adjoins the edges on both sides and these side edges, respectively, and a non-coloring light carrying out outgoing radiation of the gap from the field of the both sides of the aforementioned coloring film in the line writing direction of the transparency field corresponding to this coloring film.

[Claim 8] The large coloring film of the aforementioned surface ratio is a liquid crystal display according to claim 4 or 5 characterized by being formed in the shape of [which continues over two or more transparency fields arranged to a line writing direction] a stripe.

[Claim 9] The small coloring film of the aforementioned surface ratio is a liquid crystal display according to claim 5 characterized by to be consisted and prepared between the line sections of the aforementioned compensation-capacitance electrode and the aforementioned shading films which adjoin between the extensions of the aforementioned compensation-capacitance electrode which adjoins the edges on both sides and these side edges, respectively and ends edges, and these edges, respectively, and for a non-coloring light to carry out outgoing radiation of the gap to it from the field around the aforementioned coloring film of the transparency field corresponding to this coloring film, respectively.

[Claim 10] The aforementioned shading film is a liquid crystal display according to claim 1 which while adjoins each other in the direction of a train on both sides of the aforementioned gate line, and is characterized by forming in wrap width of face the field covering the line section of the aforementioned compensation-capacitance electrode which counters the pixel electrode of another side from the marginal part of a pixel electrode.

[Claim 11] While making the aforementioned shading film correspond to the pixel inter-electrode field which adjoins each other in the direction of a train on both sides of the aforementioned gate line, and the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line and being prepared The liquid crystal display according to claim 1 characterized by the portion corresponding to the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line of this shading film being narrower than

the width of face of the aforementioned extension of the aforementioned compensation-capacitance electrode, and forming it in wrap width of face in full [of the aforementioned data line].

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the 2 way display type liquid crystal display which displays both a reflected type display and a penetrated type display.
[0002]
[Description of the Prior Art] There is a 2 so-called way display type thing which displays both the reflected type display which uses the outdoor daylight (natural light, indoor light, etc.) which is the light of the operating environment as a liquid crystal display, and the penetrated type display using the lighting light from the lighting means generally called back light.
[0003] This 2 way liquid crystal display arranges a lighting means to turn to the aforementioned liquid crystal display element the outdoor daylight which carries out incidence, and to reflect behind a liquid crystal display element from the front of the aforementioned liquid crystal display element while turning and carrying out outgoing radiation of the lighting light to the aforementioned liquid crystal display element, and is constituted.
[0004] When the aforementioned 2 way liquid crystal display performs the reflected type display which uses outdoor daylight, without carrying out outgoing radiation of the lighting light from the aforementioned lighting means when the outdoor daylight of sufficient luminosity is obtained, and the luminosity of outdoor daylight runs short Outgoing radiation of the lighting light is carried out from the aforementioned lighting means, screen intensity is compensated, and, generally what has arranged the transflective reflecting plate is used for the front face of the lighting panel which carries out outgoing radiation of the lighting light as the aforementioned lighting means.
[0005] Moreover, generally as the aforementioned liquid crystal display element, the thing of an active matrix method which used TFT (it is hereafter described as TFT) for the active element is used.
[0006] Two or more pixel electrodes which arrange an active matrix liquid crystal display element in the shape of a matrix in a line writing direction and the direction of a train to the inside of the tooth-back side substrate of the substrates of the couple by the side of the front face which counters on both sides of a liquid crystal layer, and a tooth back, Two or more TFT connected to each of this pixel electrode, respectively, and the gate line which is made to meet the unilateral for every pixel electrode line, and it wires, and supplies a gate signal to Above TFT, The data line which is made to meet the unilateral for every pixel electrode train, and it wires, and supplies a data signal to Above TFT, The counterelectrode which the compensation-capacitance electrode which is formed for every aforementioned pixel electrode line, counters the marginal part of the aforementioned pixel electrode through an insulator layer, and forms a compensation capacitance between the aforementioned pixel electrodes is prepared, and counters the inside of a front-face side substrate at each aforementioned pixel electrode, It has the composition that the shading film corresponding to the field between two or more aforementioned pixel electrodes was prepared.
[0007] There are what displays monochrome picture, and a thing which displays multicolor color pictures, such as a full color picture, in this active matrix liquid crystal display element, and the liquid crystal display element which displays a color picture has the composition of having made two or more aforementioned pixel electrodes corresponding, respectively, having arranged in by turns the coloring film of two or more colors with which transmitted wave length bands differ in one (generally front-face side substrate) inside of the substrates of the aforementioned couple to the line writing direction, and having prepared.
[0008] Generally, the coloring film of two or more aforementioned colors is the light filter of three colors of red, green, and blue, with the conventional liquid crystal display element, in order to carry out outgoing radiation of most light which penetrates the field corresponding to two or more aforementioned pixel electrodes as a coloring light, made the coloring film of two or more aforementioned colors correspond to the whole field corresponding to the aforementioned pixel electrode, respectively, and is prepared, for example.

[0009]
[Problem(s) to be Solved by the Invention] However, 2 way liquid crystal display which displays the conventional color picture has the dark luminosity of the screen by reflected type display, and it needs to carry out outgoing radiation of the lighting light from the aforementioned lighting means, and it is necessary to compensate screen intensity with it also under comparatively bright environment.
[0010] The light of the wavelength component of the absorption wavelength-range region of the aforementioned coloring film of the light in which this penetrates a liquid crystal display element is absorbed with the aforementioned coloring film. The light of the wavelength component of the transmitted wave length band of the aforementioned coloring film penetrates the aforementioned coloring film, become coloring light, and at the time of the reflected type display which is for carrying out outgoing radiation and uses outdoor daylight The outdoor daylight which carries out incidence from the front is a strong light according to the luminosity of an operating environment. Since it passes along the aforementioned coloring film by process which a liquid crystal display element is penetrated, it is reflected by the lighting means in back, and the light penetrates the aforementioned liquid crystal display element again, and carries out outgoing radiation to the front face twice, the coloring luminous intensity which carries out outgoing radiation becomes extremely low compared with the intensity of the outdoor daylight which carries out incidence from the front.
[0011] Therefore, the conventional 2 way liquid crystal display needs to carry out outgoing radiation of the lighting light from the aforementioned lighting means, and it is necessary to compensate screen intensity with it also under comparatively bright environment, therefore it has the problem that power consumption is large.
[0012] This invention raises the luminosity of the screen by reflected type display, and it aims at offering the 2 way display type liquid crystal display which can display the good color picture of contrast with sufficient luminosity while it lessens the frequency to which outgoing radiation of the lighting light is carried out from the aforementioned lighting means and reduces power consumption, in order to compensate screen intensity.
[0013]
[Means for Solving the Problem] While the liquid crystal display of this invention is arranged behind the liquid crystal display element of an active matrix method, and the aforementioned liquid crystal display element and turning and carrying out outgoing radiation of the lighting light to the aforementioned liquid crystal display element It has a lighting means to turn to the aforementioned liquid crystal display element the outdoor daylight which carries out incidence, and to reflect from the front of the aforementioned liquid crystal display element. Two or more pixel electrodes arranged in the shape of a matrix in a line writing direction and the direction of a train to the inside of the tooth-back side substrate of the substrates of the couple by the side of the front face which counters on both sides of the liquid crystal layer of the aforementioned liquid crystal display element, and a tooth back, Two or more TFT connected to each of this pixel electrode, respectively, and the gate line which is made to meet the unilateral for every pixel electrode line, and it wires, and supplies a gate signal to the aforementioned TFT, The data line which is made to meet the unilateral for every pixel electrode train, and it wires, and supplies a data signal to the aforementioned TFT, The counterelectrode which the compensation-capacitance electrode which is formed for every aforementioned pixel electrode line, counters the marginal part of the aforementioned pixel electrode through an insulator layer, and forms a compensation capacitance between the aforementioned pixel electrodes is prepared, and counters the inside of a front-face side substrate at each aforementioned pixel electrode, The shading film corresponding to the pixel inter-electrode field of the fields between two or more aforementioned pixel electrodes which adjoins each other in the direction of a train on both sides of the aforementioned gate line at least is prepared. The coloring film of two or more colors with which transmitted wave length bands differ in one inside of the substrates of the aforementioned couple Make two or more aforementioned pixel electrodes correspond, respectively, and arrange to a line writing direction by turns, it is prepared in it, and the aforementioned compensation-capacitance electrode by the metal membrane which has a high rate of a light reflex The line section which counters the end marginal part of the aforementioned pixel electrode arranged to a line writing direction, It is formed in the configuration which has the extension which counters the side edge section of the aforementioned pixel electrode which is extended to the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line from this line section, and adjoins a line writing direction in the edges-on-both-sides section, respectively. The field surrounded with the aforementioned compensation-capacitance electrode of the fields corresponding to two or more aforementioned pixel electrodes and the aforementioned shading film, respectively, respectively They are two or more transparency fields which carry out outgoing radiation of the outdoor daylight which carries out incidence from the aforementioned lighting light which carries out incidence from a tooth-back side, and the front, and is reflected by the aforementioned lighting means ahead. While the field corresponding to the aforementioned extension of the aforementioned compensation-capacitance electrode is the reflective field which is made to reflect the outdoor daylight which carries out incidence from the front by the aforementioned compensation-capacitance electrode, and carries out outgoing radiation ahead at least The

coloring film of two or more aforementioned colors has an area smaller than the area of the aforementioned transparency field, respectively. Coloring light carries out outgoing radiation, respectively from the field corresponding to the aforementioned coloring film of two or more aforementioned transparency fields. A non-coloring light carries out outgoing radiation from the field which does not correspond to the aforementioned coloring film, respectively, and it is characterized by a non-coloring light reflected by the aforementioned compensation-capacitance electrode carrying out outgoing radiation from the reflective aforementioned field corresponding to the aforementioned extension at least of the aforementioned compensation-capacitance electrode.

[0014] When this liquid crystal display performs the reflected type display which uses outdoor daylight, without carrying out outgoing radiation of the lighting light from the aforementioned lighting means when the outdoor daylight of sufficient luminosity is obtained, and the luminosity of outdoor daylight runs short Under the environment where are the 2 way display type thing with which outgoing radiation of the lighting light is carried out from the aforementioned lighting means, and screen intensity is compensated, and outdoor daylight is obtained The light which carried out incidence to two or more transparency fields surrounded [among the outdoor daylight which carries out incidence to the aforementioned liquid crystal display element from the front] with the aforementioned compensation-capacitance electrode of the fields corresponding to two or more aforementioned pixel electrodes and the aforementioned shading film, respectively While being reflected by the lighting means which penetrated this transparency field and has been arranged at the tooth-back side of a liquid crystal display element, and the reflected light's penetrating the aforementioned transparency field and carrying out outgoing radiation ahead [of a liquid crystal display element] The light which carried out incidence is reflected in the reflective field corresponding to the aforementioned compensation-capacitance electrode by the aforementioned compensation-capacitance electrode in the inside of a tooth-back side substrate, and the reflected light carries out outgoing radiation ahead [of a liquid crystal display element].

[0015] Moreover, if outgoing radiation of the lighting light is carried out from the aforementioned lighting means, it is shaded with this compensation-capacitance electrode and a shading film, and only the light which carried out incidence to the aforementioned transparency field will penetrate this transparency field, and will carry out outgoing radiation of the light in which the lighting light carried out incidence to the aforementioned liquid crystal display element from the tooth back and which carried out incidence to the field corresponding to the aforementioned compensation-capacitance electrode and a shading film among the lighting light ahead [of a liquid crystal display element].

[0016] And since the coloring film of two or more aforementioned colors has an area respectively smaller than the area of the aforementioned transparency field in this liquid crystal display, When performing the reflected type display using outdoor daylight, and when carrying out outgoing radiation of the lighting light from the aforementioned lighting means and compensating screen intensity The coloring light (light of the wavelength component of the transmitted wave length band of a coloring film) which the light of the wavelength component of the absorption wavelength-range region was absorbed with the aforementioned coloring film, respectively from the field corresponding to the aforementioned coloring film of two or more aforementioned transparency fields, and was colored the color of the aforementioned coloring film carries out outgoing radiation. A non-coloring light which does not receive absorption by the aforementioned coloring film carries out outgoing radiation, respectively from the field which does not correspond to the coloring film of two or more aforementioned transparency fields.

[0017] Therefore, the color pixel of each color displayed by the light which carries out outgoing radiation, respectively from two or more transparency fields of the aforementioned liquid crystal display element It is colored the color of the coloring film corresponding to the transparency field. moreover, the luminosity It is the pixel in which bottom raising was carried out by non-coloring light without the brightness fall by absorption with the aforementioned coloring film. Therefore, when performing the reflected type display using outdoor daylight, and when carrying out outgoing radiation of the lighting light from the aforementioned lighting means and compensating screen intensity, compared with the case where outgoing radiation of the coloring light colored with the coloring film is carried out, a, far bright color picture can be displayed from the whole region of the aforementioned transparency field.

[0018] In this liquid crystal display the aforementioned compensation-capacitance electrode furthermore, by the metal membrane with the high reflection factor of light The line section which counters the end edge of the aforementioned pixel electrode arranged to a line writing direction, Since it forms in the configuration which has the extension which counters the side edge section of the aforementioned pixel electrode which is extended to the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line from this line section, and adjoins a line writing direction in the edges-on-both-sides section, respectively, The light which carried out incidence to the reflective field corresponding to the aforementioned extension at least of the aforementioned compensation-capacitance electrode among the outdoor daylight which carried out incidence to the aforementioned liquid crystal display element from the front It is reflected by the aforementioned compensation-capacitance electrode in the inside of the aforementioned tooth-back side substrate, and while it has been a non-coloring light without the brightness fall

by absorption with the aforementioned coloring film, outgoing radiation is carried out ahead [of a liquid crystal display element].

[0019] Moreover, since the orientation state of the liquid crystal molecule of the field corresponding to between the pixel electrodes adjoined of the reflective fields corresponding to the aforementioned compensation-capacitance electrode, i.e., the field where the drive electric field impressed between the aforementioned pixel electrode and a counterelectrode do not act, hardly changes from an initial orientation state, the reflection factor of the outdoor daylight which carried out incidence to the field aforementioned pixel inter-electrode [of the aforementioned reflective fields] is always kept high.

[0020] Therefore, the luminosity of the screen at the time of the reflected type display using outdoor daylight The luminosity of the color pixel of each color displayed by the light (coloring light and non-coloring light) which carries out outgoing radiation from two or more aforementioned transparency fields, respectively Compared with the case where outgoing radiation of the coloring light colored with the coloring film from the whole region of the aforementioned transparency field is carried out, it is far bright, and is sufficient luminosity in which bottom raising was moreover carried out in the luminosity of the whole screen by the reflected light of not coloring [which carries out outgoing radiation from the reflective field corresponding to the aforementioned compensation-capacitance electrode].

[0021] Therefore, according to this liquid crystal display, in order to raise the luminosity of the screen by reflected type display and to compensate screen intensity, the frequency to which outgoing radiation of the lighting light is carried out from the aforementioned lighting means can be lessened, and power consumption can be reduced.

[0022] Moreover, although this liquid crystal display carries out outgoing radiation of the lighting light from the aforementioned lighting means and screen intensity is compensated with it when the luminosity of outdoor daylight runs short Since the light which carried out incidence to the field corresponding to the aforementioned compensation-capacitance electrode and a shading film among the lighting light from the aforementioned lighting means is shaded with this compensation-capacitance electrode and a shading film, Even if it carries out outgoing radiation of the lighting light from the aforementioned lighting means, the light which carries out outgoing radiation from the pixel inter-electrode field (field corresponding to the extension of a compensation-capacitance electrode) which adjoins a line writing direction on both sides of the aforementioned data line It is only the reflected light of the outdoor daylight which carried out incidence from the front of a liquid crystal display element, therefore when carrying out outgoing radiation of the lighting light from the aforementioned lighting means, the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line becomes bright too much, and the contrast of a display image does not fall.

[0023] Furthermore, since the aforementioned shading film prepared in the inside of the front-face side substrate of the aforementioned liquid crystal display element corresponds to the pixel inter-electrode field of the fields between two or more aforementioned pixel electrodes which adjoins each other in the direction of a train on both sides of the aforementioned gate line at least, The pixel inter-electrode field where this shading film corresponds is in a dark state, when performing the reflected type display using outdoor daylight, and when making lighting light come out of and put from the aforementioned lighting means and compensating screen intensity, and it can improve contrast of a display image also by it.

[0024]

[Embodiments of the Invention] While the liquid crystal display of this invention is arranged behind the liquid crystal display element of an active matrix method, and the aforementioned liquid crystal display element and turning and carrying out outgoing radiation of the lighting light to the aforementioned liquid crystal display element It is the 2 way display type thing equipped with a lighting means to turn to the aforementioned liquid crystal display element the outdoor daylight which carries out incidence, and to reflect from the front of the aforementioned liquid crystal display element. as mentioned above The compensation-capacitance electrode prepared in the inside of the tooth-back side substrate of the aforementioned liquid crystal display element by the metal membrane which has a high rate of a light reflex It forms in the configuration which has the extension which counters the side edge section of the aforementioned pixel electrode which is extended to the pixel inter-electrode field which adjoins a line writing direction on both sides of a data line from the line section which counters the end marginal part of the pixel electrode arranged to a line writing direction, and this line section, and adjoins a line writing direction in the edges-on-both-sides section, respectively. The aforementioned compensation-capacitance electrode of the fields respectively corresponding to two or more pixel electrodes, The field surrounded with the shading film which was made to correspond to the pixel inter-electrode field of the fields between two or more aforementioned pixel electrodes which adjoins each other in the direction of a train on both sides of the aforementioned gate line at least, and was prepared in the inside of a front-face side substrate, respectively It considers as two or more transparency fields which carry out outgoing radiation of the

outdoor daylight which carries out incidence from the aforementioned lighting light which carries out incidence from a tooth-back side, and the front, and is reflected by the aforementioned lighting means ahead. at the time of the aforementioned compensation capacitance The aforementioned red filter is formed in 90 - 95% of area of the area of the aforementioned transparency field. When it is desirable to form the aforementioned green filter in 70 - 80% of area of the area of the aforementioned transparency field, and to form the aforementioned blue filter in 85 - 90% of area of the area of the aforementioned transparency field and it does in this way The balance of the saturation of red, green, and the color pixel of each blue color and a luminosity can display the high color picture of good color-reproduction nature.

[0025] Furthermore, by it being more desirable than the width of face of a line writing direction respectively for the width of face of the direction of a train to form in a large rectangle configuration as for the pixel electrode and light transmission field of the aforementioned plurality, and doing in this way In order to raise the luminosity of the screen by reflected type display and to compensate screen intensity by making it a whereabouts, while lessening the frequency to which outgoing radiation of the lighting light is carried out from the aforementioned lighting means and reducing power consumption It enables it to display the good color picture of contrast with sufficient luminosity.

[0026] The coloring film of the 1st color with which the coloring film of two or more aforementioned colors makes the light of the long-wavelength-region region of the visible light-pattern regions penetrate in the liquid crystal display of this invention, When it is the coloring film of three colors of the coloring film of the 2nd color which makes the light of the wavelength component of an elliptic-trochoidal-wave length band penetrate, and the coloring film of the 3rd color which makes the light of the wavelength component of a short-wavelength-region region penetrate The coloring film of the 1st color of the above is formed in a larger area than the area of the coloring film of other two colors. When it is desirable to form in an area smaller than the area of the coloring film of the 3rd color of the above and it carries out the coloring film of the 2nd color of the above of the coloring films of two colors besides the above in this way The saturation and the luminosity of a color pixel of each color which are displayed by the coloring light which carries out outgoing radiation from two or more aforementioned transparency fields, respectively, and non-coloring light can be made to be able to balance, and the good color picture of color-reproduction nature can be displayed.

[0027] In this case, when a red filter and the coloring film of the 2nd color of the above are [the coloring films of the 3rd color of a green filter and the above] blue filters for the coloring film of the 1st color of the above, [for example,] The aforementioned red filter is formed in 90 - 95% of area of the area of the aforementioned transparency field. When it is desirable to form the aforementioned green filter in 70 - 80% of area of the area of the aforementioned transparency field, and to form the aforementioned blue filter in 85 - 90% of area of the area of the aforementioned transparency field and it does in this way The balance of the saturation of red, green, and the color pixel of each blue color and a luminosity can display the high color picture of good color-reproduction nature.

[0028] Furthermore, as for the pixel electrode and light transmission field of the aforementioned plurality, it is desirable for the width of face of the direction of a train to form in a large rectangle configuration rather than the width of face of a line writing direction, and by doing in this way, they can carry out outgoing radiation of the coloring light of two or more colors by turns in a small pitch from two or more transparency fields arranged to a line writing direction, can make those color mixture good, and can display the color picture of high resolution, respectively.

[0029] Thus, when forming the aforementioned light transmission field in the rectangle configuration where the width of face of the direction of a train is larger than the width of face of a line writing direction The coloring film with the larger surface ratio to the aforementioned transparency field among the coloring films of the three aforementioned color than a predetermined value It forms in the configuration which has width of face smaller than the width of face of the line writing direction of the aforementioned transparency field, and the length covering the direction overall length of a train of the aforementioned transparency field at least. By forming a coloring film with surface ratio smaller than it in the configuration which has width of face smaller than the width of face of the field between the extensions of the aforementioned compensation-capacitance electrode, and length smaller than the direction length of a train of the aforementioned transparency field A non-coloring light carries out outgoing radiation from the field of the side of the aforementioned coloring film in the line writing direction of the transparency field corresponding to the large coloring film of the aforementioned surface ratio. When it is desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field of the side of the aforementioned coloring film in the line writing direction of the transparency field corresponding to the small coloring film of the aforementioned surface ratio, and the field of the side of the aforementioned coloring film in the direction of a train The saturation and the luminosity of a color pixel of each color which are displayed by the coloring light which carries out outgoing radiation from two or more transparency fields, respectively, and non-coloring light can be made to be able to balance better, and a color picture with still more sufficient color-reproduction nature can be displayed.

[0030] Namely, the transparency field corresponding to a coloring film with the aforementioned large surface ratio

Since the area of the non-coloring light outgoing radiation field occupied all over the field is small, if it is made to carry out outgoing radiation of the non-coloring light also in this transparency field from both the field of the side of the aforementioned coloring film, and the field of the side of the aforementioned coloring film in the direction of a train The outgoing radiation width of face of a non-coloring light becomes quite narrow, the bottom raising effect of the luminosity of the color pixel displayed by the coloring light which carries out outgoing radiation from this transparency field, and non-coloring light will no longer be demonstrated fully, and the saturation of the aforementioned color pixel will become blackish.

[0031] A coloring film with the aforementioned larger surface ratio than a predetermined value as mentioned above However, width of face smaller than the width of face of the line writing direction of the aforementioned transparency field, Form in the configuration which has the length covering the direction overall length of a train of the aforementioned transparency field at least, and from the transparency field corresponding to this coloring film If a non-coloring light is made to carry out outgoing radiation only from the field of the side of the aforementioned coloring film in a line writing direction, outgoing radiation of the non-coloring light can be carried out by sufficient width of face also from this transparency field, the bottom raising effect of the luminosity of the aforementioned color pixel can fully be demonstrated, and the color pixel of good saturation and a luminosity can be displayed.

[0032] In addition, the transparency field where the width of face of the outgoing radiation field of a non-coloring light will become quite narrow, and the bottom raising effect of the luminosity of a color pixel will no longer be demonstrated fully if it is made to carry out outgoing radiation of the non-coloring light from both the field of the side of the aforementioned coloring film in a line writing direction, and the field of the side of the aforementioned coloring film in the direction of a train The aforementioned surface ratio is [therefore] a transparency field corresponding to about 90% or more of coloring film. the aforementioned surface ratio about 90% or more of coloring film Width of face smaller than the width of face of the line writing direction of the aforementioned transparency field, It forms in the configuration which has the length covering the direction overall length of a train of the aforementioned transparency field at least, and the field of the side of the aforementioned coloring film in a line writing direction to a non-coloring light should just be made to carry out outgoing radiation from the transparency field corresponding to this coloring film.

[0033] On the other hand, the transparency field corresponding to a coloring film with the aforementioned small surface ratio Since the area of the non-coloring light outgoing radiation field occupied all over the field is large, if a non-coloring light is made to carry out outgoing radiation only from the field of the side of the aforementioned coloring film in a line writing direction, like the transparency field corresponding to a coloring film with the aforementioned large surface ratio The outgoing radiation width of face of a non-coloring light will become large too much, and the saturation of the color pixel displayed by the coloring light which carries out outgoing radiation from this transparency field, and non-coloring light will become whitish.

[0034] However, the aforementioned surface ratio forms a small coloring film in the configuration which has width of face smaller than the width of face of the field between the extensions of the aforementioned compensation-capacitance electrode, and length smaller than the direction length of a train of the aforementioned transparency field as mentioned above. If a non-coloring light is made to carry out outgoing radiation from the field of the side of the aforementioned coloring film in the line writing direction of the transparency field corresponding to this coloring film, and the field of the side of the aforementioned coloring film in the direction of a train Outgoing radiation width of face of a non-coloring light from this transparency field can be made into the range to which the saturation of the aforementioned color pixel does not become whitish while fully demonstrating the bottom raising effect of the luminosity of the aforementioned color pixel.

[0035] And if the color pixel of good saturation and a luminosity can be displayed also in the transparency field corresponding to the coloring film of which color, the saturation and the luminosity of a color pixel of each color can be made to be able to balance better, and a color picture with still more sufficient color-reproduction nature can be displayed.

[0036] In addition, the large coloring film of the aforementioned surface ratio consists and prepares a gap between the extensions of the aforementioned compensation-capacitance electrode which adjoins the edges on both sides and these side edges, respectively. When it is more desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field of the both sides of the aforementioned coloring film in the line writing direction of the transparency field corresponding to this coloring film The saturation and the luminosity of a color pixel which are displayed by the outgoing radiation light from the transparency field corresponding to the large coloring film of the aforementioned surface ratio can be made more into fitness.

[0037] Moreover, the large coloring film of the aforementioned surface ratio may be formed in the shape of [which continues over two or more transparency fields arranged to a line writing direction] a stripe, and can make the

aforementioned coloring film formation easily by doing in this way.

[0038] Furthermore, between the extensions of the aforementioned compensation-capacitance electrode to which the small coloring film of the aforementioned surface ratio adjoins the edges on both sides and these side edges, respectively, And a gap is consisted and prepared, respectively between the line sections of the aforementioned compensation-capacitance electrode and the aforementioned shading films which adjoin ends edges and these edges, respectively. When it is more desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field around the aforementioned coloring film of the transparency field corresponding to this coloring film The saturation and the luminosity of a color pixel which are displayed by the outgoing radiation light from the transparency field corresponding to the small coloring film of the aforementioned surface ratio can be made more into fitness.

[0039] As for the aforementioned shading film, on the other hand, it is desirable for while to adjoin each other in the direction of a train on both sides of the aforementioned gate line, and to form in wrap width of face the field covering the line section of the aforementioned compensation-capacitance electrode which counters the pixel electrode of another side from the marginal part of a pixel electrode. The field corresponding to between the pixel electrodes which adjoin each other in the direction of a train on both sides of the aforementioned gate line by doing in this way It can shade over the line section of the aforementioned compensation-capacitance electrode which counters the marginal part of the pixel electrode of another side from the marginal part of aforementioned one pixel electrode, the optical leakage from the field can be abolished, and a color picture with more sufficient contrast can be displayed.

[0040] Moreover, by making it correspond to the pixel inter-electrode field which adjoins each other in the direction of a train on both sides of the aforementioned gate line, and the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line, preparing, and doing in this way, the aforementioned shading film can make a dark state the field where the aforementioned shading film of the pixel inter-electrode fields which adjoin the aforementioned train direction and a line writing direction corresponds, and can improve contrast of a display image further.

[0041] In this case, the portion corresponding to the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line of the aforementioned shading film By being narrower than the width of face of the aforementioned extension of the aforementioned compensation-capacitance electrode, and it being desirable to form full [of the aforementioned data line] in wrap width of face, and doing in this way The outdoor daylight which carried out incidence can be reflected in the field which does not correspond to the aforementioned shading film of the pixel inter-electrode fields which adjoin the aforementioned line writing direction by the extension of the aforementioned compensation-capacitance electrode, outgoing radiation can be carried out ahead [of a liquid crystal display element], and bottom raising of the luminosity of the whole screen can be carried out by the reflected light (non-coloring light).

[0042]

[Example] The expanded sectional view and drawing 3 to which drawing 1 - drawing 5 show the 1st example of this invention, drawing 1 meets some front view of a liquid crystal display, and drawing 2 meets the II-II line of drawing 1 are drawing 1 . III-III The expanded sectional view which meets a line, the expanded sectional view to which drawing 4 meets the IV-IV line of drawing 1 , and drawing 5 are drawing 1 . V-V It is the expanded sectional view which meets a line.

[0043] The liquid crystal display of this example consists of a liquid crystal display element 1 of the active matrix method which displays a color picture, and a lighting means 24 which has the reflex function of the light arranged behind this liquid crystal display element 1, as shown in drawing 2 - drawing 5 .

[0044] The aforementioned active matrix liquid crystal display element 1 As TFT (TFT) is used for an active element and it is shown in drawing 1 - drawing 5 The inside of the transparent substrates 2 and 3 of the couple by the side of the front face which counters on both sides of the liquid crystal layer 21, and a tooth back, Two or more transparent pixel electrodes 4 arranged in the shape of a matrix to the inside of the tooth-back side substrate 3 in a line writing direction (longitudinal direction of a screen), and the direction of a train (the vertical direction of a screen), Two or more gate lines 11 which supply a gate signal to two or more TFT5 connected to these pixel electrodes 4, respectively, and TFT5 of each line, respectively, The data line 12 which supplies a data signal to TFT5 of each train, respectively, and the compensation-capacitance electrode 13 which counters the marginal part of the aforementioned pixel electrode 4 through an insulator layer (gate insulator layer of TFT4) 7, and forms a compensation capacitance between the aforementioned pixel electrodes 4 are formed.

[0045] The gate electrode 6 formed on the inside of the tooth-back side substrate 3 as the above TFT 5 was shown in drawing 1 , The i-type-semiconductor film 8 which this gate electrode 6 was made to counter with the aforementioned gate electrode 6 on the wrap gate insulator layer 7 and the aforementioned gate insulator layer 7, and was formed, It

consists of the source electrode 9 and the drain electrode 10 which were formed through the n-type-semiconductor film (not shown) on the both-sides section of this i-type-semiconductor film 8.
[0046] The aforementioned gate line 11 makes the unilateral meet for every pixel electrode line on the inside of the tooth-back side substrate 3, and is wired, and the gate electrode 6 of TFT5 of each line is formed in the gate line 11 corresponding to the line at one. In addition, the gate insulator layer (transparent membrane) 7 of the above TFT 5 is formed over the whole simultaneously surface of the aforementioned substrate 3, and the aforementioned gate line 11 is covered by the gate insulator layer 7 except for the terminal area.
[0047] Moreover, the aforementioned data line 12 makes the unilateral meet for every pixel electrode train on the aforementioned gate insulator layer 7, and is wired, and the drain electrode 10 of TFT5 of each train is connected with the data line 12 corresponding to the train.
[0048] in addition, the contact which the aforementioned data line 12 covered TFT5 by the layer insulation film, wired on it, and was prepared in the aforementioned layer insulation film although the data line 12 was wired on the gate insulator layer 7 and the drain electrode 10 of TFT5 of each train was formed in the data line 12 corresponding to the train in this example at one, respectively -- you may connect with the drain electrode 10 of the above TFT 5 in a hole
[0049] And the aforementioned pixel electrode 4 is formed on the aforementioned gate insulator layer 7, and these pixel electrodes 4 are connected to the source electrode 9 of TFT5 which corresponds in the edge of the unilateral edge.

[0050] Moreover, on the inside of the aforementioned substrate 3, the aforementioned compensation-capacitance electrode 13 makes it correspond for every aforementioned pixel electrode line, and is formed, and the compensation capacitance for compensating change of the potential of the pixel electrode 4 of a non-selection period by the marginal part of this compensation-capacitance electrode 13 and the aforementioned pixel electrode 4 and the gate insulator layer 7 in the meantime is formed.
[0051] Line section 13a which counters the end marginal part of the pixel electrode 3 which arranges this compensation-capacitance electrode 13 to a line writing direction, It is formed in the configuration which has extension 13b which counters the side edge section of the pixel electrode 4 which adjoins a line writing direction on both sides of the aforementioned data line 12 from this line section 13a, and the aforementioned pixel electrodes 4 and 4 which are extended to the field between four and adjoin a line writing direction in the edges-on-both-sides section, respectively. the aforementioned compensation capacitance It is made to correspond to three marginal parts of the end marginal part of each pixel electrode 4, and the edges-on-both-sides section, and is formed.
[0052] In addition, line section 13a of this compensation-capacitance electrode 13 The edge section of an opposite side is made to counter with an aforementioned pixel electrode's 4 TFT connection side, and it is mostly formed in parallel with the aforementioned gate line 11. extension 13b The length which reaches near the edge by the side of TFT connection of the aforementioned pixel electrode 4 is covered. It is formed in the width of face which counters the side edge section of each of the pixel electrodes 4 and 4 which the edges-on-both-sides section adjoins in a line writing direction, therefore this extension 13b has countered the field of the length of most fields between the pixel electrode 4 which adjoins each other the account of before, and 4 covering full [the].
[0053] The aforementioned compensation-capacitance electrode 13 is low resistance of an aluminum system alloy etc., and is formed of the metal membrane with the high reflection factor of light, and the aforementioned gate line 11 is formed by the same metal membrane as the aforementioned compensation-capacitance electrode 13. In addition, in order to make high isolation voltage between the pixel electrodes 4 and data lines 12 which are formed on the gate insulator layer 7, anodizing of the aforementioned compensation-capacitance electrode 13 and the gate line 11 is carried out in the front face. Moreover, the aforementioned data line 12 is formed of the metal membrane with the reflection factor of light high like the aforementioned compensation-capacitance electrode 13 which is low resistance of an aluminum system alloy etc.
[0054] Furthermore, although omitted in drawing 1 , as shown in the inside of the aforementioned tooth-back side substrate 3 at drawing 2 - drawing 5 , the transparent overcoat insulator layer 14 which covers the above TFT 5 and a data line 12 is formed, and the orientation film 15 is formed over the whole array field of the pixel electrode 4 on it.
[0055] On the other hand, the shading film 16 corresponding to the field between the pixel electrode 4 which adjoins each other in the direction of a train on both sides of the gate line 11 of the fields between two or more aforementioned pixel electrodes 4 and 4, and 4 is formed in the inside of the substrate 2 by the side of a front face, respectively. In addition, in drawing 1 , in order to make the shading film 16 easy to distinguish, the parallel slash is given to the shading film portion.
[0056] The aforementioned shading film 16 consists of a metal membrane of dark color systems, such as chromium. this shading film 16 On both sides of the gate line 11, while adjoins each other in the direction of a train, and the field covering line section 13a of the aforementioned compensation-capacitance electrode 13 which counters the pixel

electrode 4 of another side from the marginal part of the pixel electrode 4 is formed in wrap width of face. Extension 13b of the aforementioned compensation-capacitance electrode 13 prepared in the inside of the aforementioned tooth-back side substrate 3 corresponds to the whole field without the aforementioned shading film 16.

[0057] In this example, the unilateral edge (it sets to drawing 1 and is the upper-limb section) counters the edge section of aforementioned one pixel electrode 4 in the aforementioned shading film 16. It forms in the width of face which counters the unilateral section (flank by the side of the edge of the pixel electrode 4) of line section 13a of the compensation-capacitance electrode 13 to which the other side edge section (it sets to drawing 1 and is a lower edge) counters the pixel electrode 4 of aforementioned another side. Therefore, the other flanks (flank of the central site of the pixel electrode 4) of line section 13a of the aforementioned compensation-capacitance electrode 13 are not covered by the aforementioned shading film 16.

[0058] Moreover, two or more aforementioned pixel electrodes 4 are made to correspond, respectively, and the light filters 17R, 17G, and 17B of three colors of the coloring film of two or more colors with which transmitted wave length bands differ, for example, red, green, and blue arrange to the inside of this front-face side substrate 2 by turns, and are prepared in it at the line writing direction. In addition, in drawing 1 , in order to make easy to distinguish light filters 17R, 17G, and 17B, the point pattern is given to the light-filter portion.

[0059] These light filters 17R, 17G, and 17B are covered on it by the transparent protection insulator layer 18 of the front-face side substrate 2 mostly prepared over the whole, the transparent counterelectrode 19 of the shape of an one-sheet film which counters all the aforementioned pixel electrodes 4 is formed on this protection insulator layer 18, and the orientation film 20 is formed on it. In addition, the aforementioned protection insulator layer 18 can be excluded by choosing the quality of the material of light filters 17R, 17G, and 17B proper.

[0060] The substrates 2 and 3 of the couple by the side of the front face of the above and a tooth back are joined through the frame-like sealant which is not illustrated in the periphery section, and the liquid crystal layer 21 is formed in the field surrounded by these substrates 2 and the aforementioned sealant between three.

[0061] In addition, the liquid crystal molecule of the liquid crystal layer 21 which this liquid crystal display element 1 is a TN type thing, and was prepared between the substrate 2 of a couple, and 3 The direction [near each substrate 2 and 3] of orientation is regulated with the orientation film 21 of the front-face side substrate 2, and the orientation film 15 of the tooth-back side substrate 3. Twist orientation is carried out on the predetermined twist square (for example, about 90 degrees) between both the substrates 2 and 3, and polarizing plates 22 and 23 turn each transparency shaft in the predetermined direction, and are arranged at the external surface of the substrates 2 and 3 of the aforementioned couple, respectively.

[0062] And the inside of the field respectively corresponding to two or more aforementioned pixel electrodes 4 of this liquid crystal display element 1, The field surrounded with line section 13a of the aforementioned compensation-capacitance electrode 13 and extension 13b, and the aforementioned shading film 16, respectively They are two or more transparency fields A which carry out outgoing radiation of the outdoor daylight which carries out incidence from the lighting light (lighting light from the lighting means 24) which carries out incidence from a tooth-back side, and the front, and is reflected by the aforementioned lighting means 24 ahead. Moreover, the field corresponding to the aforementioned extension 13b of the aforementioned compensation-capacitance electrode 13 formed of the metal membrane with the high reflection factor of light is the reflective field S which is made to reflect the outdoor daylight which carries out incidence from the front by the aforementioned compensation-capacitance electrode 13, and carries out outgoing radiation ahead at least.

[0063] In addition, although the data line 12 prepared in the inside of the tooth-back side substrate 3 of the liquid crystal display element 1 passes along the inside of the aforementioned reflective field S, since this data line 12 is also formed of the metal membrane with the high reflection factor of light, it is reflected by the aforementioned data line 12 and it carries out outgoing radiation of the light which carried out incidence to the portion corresponding to the aforementioned data line 12 of the light which carried out incidence to the aforementioned reflective field S ahead.

[0064] Moreover, in this example, as the aforementioned shading film 16 was mentioned above, on both sides of the gate line 11, while adjoins each other in the direction of a train, and the unilateral marginal part counters the edge section of the pixel electrode 4. Since the other side edge section forms in the width of face which counters the unilateral section of line section 13a of the compensation-capacitance electrode 13 which counters the pixel electrode 4 of another side, It is not covered by the shading film 16 of line section 13a of the aforementioned compensation-capacitance electrode 13, and also the field corresponding to a flank (flank of the central site of the pixel electrode 4) is the reflective field S which is made to reflect the outdoor daylight which carries out incidence from the front by the aforementioned compensation-capacitance electrode 13, and carries out outgoing radiation ahead.

[0065] Furthermore, this liquid crystal display element 1 is the thing of a normally white mode. The sense of the transparency shaft of the direction [near the twist angle of the liquid crystal molecule of the aforementioned liquid

crystal layer 21, and the substrates 2 and 3 of a couple] of orientation, and the front-face side polarizing plate 22 The permeability of the light which it is reflected by the aforementioned compensation-capacitance electrode 13 in the inside of the tooth-back side substrate 3 of the light which carried out incidence from the front of the liquid crystal display element 1, and carries out outgoing radiation to the front face of the liquid crystal display element 1 It is set up so that it may become the maximum mostly, when it is in the early twist orientation state where the liquid crystal molecule lodged most to the 2 or 3rd page of a substrate. the sense of the transparency shaft of the tooth-back side polarizing plate 23 The permeability of the outdoor daylight which carries out incidence according to the sense of the transparency shaft of the front-face side polarizing plate 22 from the front of the aforementioned lighting light which carries out incidence to the liquid crystal display element 1 from the tooth-back side, and which carries out outgoing radiation ahead, and the liquid crystal display element 1, and it is reflected by the aforementioned lighting means 24, and carries out outgoing radiation ahead It is set up so that it may become low in connection with carrying out orientation so that a liquid crystal molecule may recover from an early twist orientation state to the 2 or 3rd page of a substrate.

[0066] Moreover, the light filters 17R, 17G, and 17B of three colors of the aforementioned red and green which were prepared in the inside of the front-face side substrate 2 of the aforementioned liquid crystal display element 1, and blue are formed in an area respectively smaller than the area of two or more transparency fields A surrounded with line section 13a of the aforementioned compensation-capacitance electrode 13 and extension 13b, and the aforementioned shading film 16.

[0067] Therefore, the field corresponding to the light filters 17R, 17G, and 17B of the transparency field A of the aforementioned plurality [element / liquid crystal display / 1 / this] The red who colored it from a the color of the aforementioned light filters 17R, 17G, and 17B, (It is hereafter called a filter correspondence field) While carrying out outgoing radiation of green and the blue coloring light, respectively and carrying out outgoing radiation of the non-coloring light, respectively from the field (henceforth a non-filter field) b which does not correspond to light filters 17R, 17G, and 17B Outgoing radiation of the non-coloring light reflected by the aforementioned compensation-capacitance electrode 13 is carried out from the reflective aforementioned field S corresponding to the aforementioned extension 13b at least of the aforementioned compensation-capacitance electrode 13.

[0068] Furthermore, the light filters 17R, 17G, and 17B of three colors of the aforementioned red, green, and blue The transmitted wave length bands differ mutually, and red filter 17R which is the coloring film of the 1st color makes the light of the long-wavelength-region region of the visible light-pattern regions penetrate. Green filter 17G which are the coloring film of the 2nd color make the light of the wavelength component of an elliptic-trochoidal-wave length band penetrate, and blue filter 17B which is the coloring film of the 3rd color makes the light of the wavelength component of a short-wavelength-region region penetrate.

[0069] In this example, therefore, red filter 17R which makes the light of the wavelength component of a long-wavelength-region region penetrate It forms in a larger area than the area of the filters 17G and 17B of other two colors. Green filter 17G which make the light of the wavelength component of the elliptic-trochoidal-wave length band of the filters 17G and 17B of two colors besides the above penetrate are formed in an area smaller than the area of blue filter 17B which makes the light of the wavelength component of a short-wavelength-region region penetrate.

[0070] It is desirable that these light filters 17R, 17G, and 17B form the aforementioned red filter 17R in 90 - 95% of area of the area of the aforementioned transparency field A, and form 70 - 80% of area of the area of the aforementioned transparency field A and the aforementioned blue filter 17B in 85 - 90% of area of the area of the aforementioned transparency field A for the aforementioned green filter 17G.

[0071] In this example, the aforementioned red filter 17R is formed in 90% of area of the area of the aforementioned transparency field A, the aforementioned green filter 17G are formed in 70% of area of the area of the aforementioned transparency field A, and the aforementioned blue filter 17B is formed in 85% of area of the area of the aforementioned transparency field A.

[0072] Moreover, the pitch of two or more transparency fields A which two or more aforementioned pixel electrodes 4 and the light transmission field A are formed in the rectangle configuration where the width of face of the direction of a train is larger than the width of face of a line writing direction, respectively, therefore are arranged to a line writing direction is set up small.

[0073] And the inside of the light filters 17R, 17G, and 17B of the aforementioned red, green, and blue, Red filter 17R whose light filter with the larger surface ratio to the aforementioned transparency field A than a predetermined value, i.e., the surface ratio to the aforementioned transparency field A, is 90% or more It is formed in the configuration which has width of face smaller than the width of face of the line writing direction of the aforementioned transparency field A, and the length covering the direction overall length of a train of the aforementioned transparency field A at least. The green and the blue filters 17G and 17B with surface ratio smaller than it are formed in the configuration

which has width of face smaller than the width of face of the field between extension 13b of the aforementioned compensation-capacitance electrode 13, and length smaller than the direction length of a train of the aforementioned transparency field A, respectively.

[0074] Furthermore, the aforementioned red filter 17R is consisted and prepared in the gap, respectively between extension 13b of the aforementioned compensation-capacitance electrode 13 which adjoins the edges on both sides and these side edges, respectively. therefore, the side of the both sides of the aforementioned red filter 17R [in / a line writing direction / in the transparency field A corresponding to this red filter 17R] -- a field is the non-filter field b, respectively, and a non-coloring light carries out outgoing radiation from the non-filter field b of these both sides, respectively

[0075] The aforementioned green filter 17G and blue filter 17B moreover, respectively Between extension 13b of the aforementioned compensation-capacitance electrode 13 which adjoins the edges on both sides and these side edges, respectively, And the gap is consisted and prepared, respectively between line section 13a of the aforementioned compensation-capacitance electrode 13 and the aforementioned shading films 16 which adjoin ends edges and these edges, respectively. Therefore, the transparency field A corresponding to this green filter 17G and blue filter 17B A field is the non-filter field b. the side of the both sides of the light filters 17G and 17B in the line writing direction of the field A around the aforementioned light filters 17G and 17B, i.e., a transparency field, -- the side by the side of the ends of the light filters 17G and 17B in a field and the direction of a train -- A non-coloring light carries out outgoing radiation from the non-filter field b of this circumference of a filter.

[0076] Next, if the lighting means 24 arranged behind the aforementioned liquid crystal display element 1 is explained, the lighting means 24 used in this example will arrange the transflective reflecting plate 26 in the front face of the lighting panel 25 which carries out outgoing radiation of the lighting light, as shown in drawing 2 - drawing 5 .

[0077] The aforementioned lighting panel 25 For example, transparent light guide plate 25a which consists of an acrylic resin which is called side light type, made the end side the plane of incidence of light at least, and was made into the outgoing radiation side of the light which incorporated the front face from the aforementioned end face, It consists of the light sources which were made to counter the aforementioned end face of this light guide plate 25a, and have been arranged and which are not illustrated (a straight pipe-like fluorescent lamp, LED array which aligned two or more light emitting diodes), and the aforementioned transflective reflecting plate 26 is arranged in the front face of the aforementioned light guide plate 25a.

[0078] When this liquid crystal display performs the reflected type display which uses outdoor daylight, without carrying out outgoing radiation of the lighting light from the aforementioned lighting means 24 when the outdoor daylight of sufficient luminosity is obtained, and the luminosity of outdoor daylight runs short Under the environment where are the 2 way display type thing with which outgoing radiation of the lighting light is carried out from the aforementioned lighting means 24, and screen intensity is compensated, and outdoor daylight is obtained The light which carried out incidence to two or more transparency fields A surrounded [among the outdoor daylight which carries out incidence to the aforementioned liquid crystal display element 1 from the front] with the aforementioned compensation-capacitance electrode 13 of the fields corresponding to two or more aforementioned pixel electrodes 4 and the aforementioned shading film 16, respectively It is reflected by the transflective reflecting plate 26 of the front face of the aforementioned lighting means 24 which penetrated this transparency field A and has been arranged at the tooth-back side of the liquid crystal display element 1. While the reflected light penetrates each transparency field A of the aforementioned liquid crystal display element 1 and carries out outgoing radiation ahead [of the liquid crystal display element 1] The light which carried out incidence is reflected in the reflective field S corresponding to the aforementioned compensation-capacitance electrode 13 by the aforementioned compensation-capacitance electrode 13 in the inside of the tooth-back side substrate 3 of the liquid crystal display element 1, and the reflected light carries out outgoing radiation ahead [of the liquid crystal display element 1].

[0079] In addition, as mentioned above, it is reflected by the data line 12 and outgoing radiation of the light which carried out incidence to the portion corresponding to the data line 12 prepared in the aforementioned reflective field S among the light which carried out incidence at the inside of the tooth-back side substrate 3 of the liquid crystal display element 1 is carried out ahead.

[0080] Moreover, if outgoing radiation of the lighting light is carried out from the aforementioned lighting means 24, the lighting light will carry out incidence to the aforementioned liquid crystal display element 1 from the tooth back. It is shaded with this compensation-capacitance electrode 13 and the shading film 16, and only the light which carried out incidence to the aforementioned transparency field A penetrates this transparency field A, and carries out outgoing radiation of the light which carried out incidence to the field corresponding to the aforementioned compensation-capacitance electrode 13 and the shading film 16 among the lighting light ahead [of the liquid crystal display element 1].

[0081] And since the light filters 17R, 17G, and 17B of the aforementioned red, green, and blue 3 color are formed in an area smaller than the area of the aforementioned transparency field A in this liquid crystal display, respectively, When performing the reflected type display using outdoor daylight, and when carrying out outgoing radiation of the lighting light from the aforementioned lighting means 24 and compensating screen intensity From the filter correspondence field a of two or more aforementioned transparency fields A, respectively The coloring light (light of the wavelength component of the transmitted wave length band of light filters 17R, 17G, and 17B) which the light of the wavelength component of the absorption wavelength-range region was absorbed by the aforementioned light filters 17R, 17G, and 17B, and was colored the color of the aforementioned light filters 17R, 17G, and 17B carries out outgoing radiation. A non-coloring light which does not receive absorption by the aforementioned light filters 17R, 17G, and 17B carries out outgoing radiation, respectively from the non-filter field b of two or more aforementioned transparency fields A.

[0082] In addition, from the filter correspondence field a of the aforementioned transparency field A, the coloring light which carries out outgoing radiation, and a non-colored light which carries out outgoing radiation from the aforementioned non-filter field b are mixed, and it is visible to the eyes of human being who observes the display of a liquid crystal display.

[0083] Therefore, the red and green which are displayed by the light which carries out outgoing radiation, respectively from two or more transparency fields A of the aforementioned liquid crystal display element 1, and the color pixel of each blue color are pixels in which colored it the color of the light filters 17R, 17G, and 17B corresponding to the transparency field A, and bottom raising was moreover carried out by the non-coloring light which does not have the brightness fall by absorption by the aforementioned light filters 17R, 17G, and 17B in the luminosity.

[0084] And the coloring light and the non-coloring luminous intensity which carry out outgoing radiation from the filter correspondence field a of the transparency field A and the non-filter field b of the aforementioned plurality It changes according to change of the orientation state of the liquid crystal molecule by the drive electric field impressed between the pixel electrode 4 and a counterelectrode 19. by that cause The luminosity of the red and green which are displayed by the outgoing radiation light from two or more transparency fields A, and a blue color pixel changes, and a full color picture is displayed by the color mixture of these color pixels.

[0085] Therefore, when performing the reflected type display using outdoor daylight, and when carrying out outgoing radiation of the lighting light from the aforementioned lighting means 24 and compensating screen intensity, compared with the case where outgoing radiation of the coloring light colored by the light filter is carried out, a, far bright color picture can be displayed from the whole region of the aforementioned transparency field A.

[0086] In this liquid crystal display the aforementioned compensation-capacitance electrode 13 furthermore, by the metal membrane with the high reflection factor of light Line section 13a which counters the end marginal part of the pixel electrode 4 arranged to a line writing direction, Since it forms in the configuration which has extension 13b which counters the side edge section of the pixel electrode 4 which adjoins a line writing direction on both sides of a data line 12 from this line section 13a, and the pixel electrodes 4 and 4 which are extended to the field between four and adjoin a line writing direction in the edges-on-both-sides section, respectively, The light which carried out incidence to the reflective field S corresponding to the aforementioned extension 13b at least of the aforementioned compensation-capacitance electrode 13 among the outdoor daylight which carried out incidence to the aforementioned liquid crystal display element 1 from the front It is reflected by the aforementioned compensation-capacitance electrode 13 in the inside of the tooth-back side substrate 3, and while it has been a non-coloring light without the brightness fall by absorption by the aforementioned light filters 17R, 17G, and 17B, outgoing radiation is carried out ahead [of the liquid crystal display element 1].

[0087] In addition, the non-coloring luminous intensity which carries out outgoing radiation changes from the field (field corresponding to the edges-on-both-sides section of extension 13b of the compensation-capacitance electrode 13) which counters the marginal part of the pixel electrode 4 of the reflective fields S corresponding to the aforementioned compensation-capacitance electrode 13 according to change of the orientation state of the liquid crystal molecule by the drive electric field impressed between the pixel electrode 4 and a counterelectrode 19.

[0088] However, since the orientation state of the liquid-crystal molecule of the field between pixels corresponding to between the pixel electrodes 4 and 4 adjoined of the aforementioned reflective fields S, i.e., the field where the drive electric field impressed between the aforementioned pixel electrode 4 and a counterelectrode 19 do not act, hardly changes from an initial orientation state, the reflection factor of the outdoor daylight which carried out incidence to the aforementioned field between pixels of the aforementioned reflective fields S is always kept high.

[0089] Therefore, the luminosity of the screen at the time of the reflected type display using outdoor daylight The luminosity of the color pixel of each color displayed by the light (coloring light and non-coloring light) which carries out outgoing radiation from two or more aforementioned transparency fields A, respectively Compared with the case

where outgoing radiation of the coloring light colored by the light filter from the whole region of the aforementioned transparency field A is carried out, it is far bright, and is sufficient luminosity in which bottom raising was moreover carried out in the luminosity of the whole screen by the reflected light of not coloring [which carries out outgoing radiation from the reflective field S corresponding to the aforementioned compensation-capacitance electrode 13].
[0090] Therefore, according to this liquid crystal display, in order to raise the luminosity of the screen by reflected type display and to compensate screen intensity, the frequency to which outgoing radiation of the lighting light is carried out from the aforementioned lighting means 24 can be lessened, and power consumption can be reduced.
[0091] Moreover, although this liquid crystal display carries out outgoing radiation of the lighting light from the aforementioned lighting means 24 and screen intensity is compensated with it when the luminosity of outdoor daylight runs short Since the light which carried out incidence to the field corresponding to the aforementioned compensation-capacitance electrode 13 and the shading film 16 among the lighting light from the aforementioned lighting means 24 is shaded with this compensation-capacitance electrode 13 and the shading film 16, Even if it carries out outgoing radiation of the lighting light from the aforementioned lighting means 24, the pixel electrode 4 which adjoins a line writing direction on both sides of the aforementioned data line 12, and the light which carries out outgoing radiation from the field between four (field corresponding to extension 13b of the compensation-capacitance electrode 13) It is only the reflected light of the outdoor daylight which carried out incidence from the front of the liquid crystal display element 1. The sake, When carrying out outgoing radiation of the lighting light from the aforementioned lighting means 24, the field between the pixel electrode 4 which adjoins a line writing direction on both sides of the aforementioned data line 12, and 4 becomes bright too much, and the contrast of a display image does not fall.
[0092] Furthermore, the aforementioned shading film 16 prepared in the inside of the front-face side substrate 2 of the aforementioned liquid crystal display element 1 Since it corresponds to the pixel electrode 4 of the fields between two or more aforementioned pixel electrodes 4 and 4 which adjoins each other in the direction of a train on both sides of the aforementioned gate line at least, and the field between four, The pixel inter-electrode field where this shading film 16 corresponds is in a dark state, when performing the reflected type display using outdoor daylight, and when making lighting light come out of and put from the aforementioned lighting means and compensating screen intensity, and it can improve contrast of a display image also by it.
[0093] In addition, since the field covering line section 13a of the compensation-capacitance electrode 13 which while adjoins each other in the direction of a train on both sides of the gate line 11, and counters the pixel electrode 4 of another side from the marginal part of the pixel electrode 4 in the aforementioned shading film 16 is formed in wrap width of face in this example, The field corresponding to between the pixel electrodes 4 and 4 which adjoin each other in the direction of a train on both sides of the aforementioned gate line 11 It can shade over line section 13a of the compensation-capacitance electrode 13 which counters the marginal part of the pixel electrode 4 of another side from the marginal part of aforementioned one pixel electrode 4, the optical leakage from the field can be abolished, and a color picture with more sufficient contrast can be displayed.
[0094] In the above-mentioned example, and red filter 17R which makes the light of the aforementioned red, green, and the long-wavelength-region region of the light filters 17R, 17G, and 17B of three blue colors penetrate While forming in a larger area than the area of the light filters (a green filter and blue filter) 17G and 17B of other two colors Since light-filter 17G of two colors besides the above and green filter 17G which make the light of the elliptic-trochoidal-wave length band of the 17B coloring films penetrate are formed in an area smaller than the area of blue filter 17B which makes the light of a short long-wavelength-region region penetrate, The saturation and the luminosity of a color pixel of each color which are displayed by the coloring light which carries out outgoing radiation from two or more aforementioned transparency fields A, respectively, and non-coloring light can be made to be able to balance, and the good color picture of color-reproduction nature can be displayed.
[0095] Namely, generally, if a light filter tends to be thin-film-ized and makes a light filter thin, although the coloring luminous intensity which lessens the absorption of light which this light filter depends, and carries out outgoing radiation can be raised In having made it thin, the thickness of a light filter only the foreground color red, green, and the average permeability of a blue light filter shift, respectively, and the color balance of the light of each color which penetrated these light filters becomes bad, and according to the additive mixture of colors of the light of red, green, and blue -- cyanogen (blueness cut -- green) -- near -- a sake -- a good white display -- obtaining -- not having .
[0096] However, like this example, if the light filters 17R, 17G, and 17B of red, green, and blue are changed as mentioned above, respectively Since the saturation and the luminosity of a color pixel which are decided by the quantity of light ratio of the coloring light and a non-coloring light which carry out outgoing radiation from each transparency field A can be adjusted for every color of red, green, and blue, Aggravation of the color balance of the red by the shift of the average permeability of the light filters 17R, 17G, and 17B of each color when thin-film-izing a light filter, green, and a blue coloring light can be compensated. The sake, The saturation and the luminosity of a color pixel

of each color which are displayed by the coloring light which carries out outgoing radiation from each transparency field A, respectively, and non-coloring light can be made to be able to balance, and a color picture with sufficient repeatability can be displayed.

[0097] Furthermore, in the above-mentioned example, red filter 17R which makes the light of the aforementioned red, green, and the long-wavelength-region region of the light filters 17R, 17G, and 17B of three blue colors penetrate is formed in a larger area than the area of the light filters 17G and 17B of other two colors. Since green filter 17G which make the light of the elliptic-trochoidal-wave length band of the light filters 17G and 17B of two colors besides the above penetrate are formed in an area smaller than the area of blue filter 17B which makes the light of a short-wavelength-region region penetrate, The saturation and the luminosity of the red and green which are displayed by the coloring color which carries out outgoing radiation from two or more transparency fields A, respectively, and non-coloring light, and the color pixel of three blue colors can be made to be able to balance good, and a color picture with more sufficient color-reproduction nature can be displayed.

[0098] As mentioned above, in addition, the light filters 17R, 17G, and 17B of the aforementioned red, green, and blue 90 - 95% of area of the area of the transparency field A, and green filter 17G for red filter 17R 70 - 80% of area of the area of the transparency field A, Forming blue filter 17B in 85 - 90% of area of the area of the aforementioned transparency field A preferably, for example, as mentioned above If red filter 17R is formed in 90% of area of the area of the transparency field A, green filter 17G are formed in 70% of area of the area of the transparency field A and blue filter 17B is formed in 85% of area of the area of the transparency field A The balance of the saturation of red, green, and the color pixel of each blue color and a luminosity can display the high color picture of good color-reproduction nature.

[0099] In the above-mentioned example, furthermore, by forming two or more aforementioned pixel electrodes 4 and the light transmission field A in the rectangle configuration where the width of face of the direction of a train is larger than the width of face of a line writing direction, respectively Since the pitch of two or more transparency fields A arranged to a line writing direction is set up small, outgoing radiation of red, green, and the blue coloring light can be carried out by turns in a small pitch from two or more transparency fields A arranged to a line writing direction, those color mixture can be made good, and the color picture of high resolution can be displayed.

[0100] And the red respectively corresponding to two or more transparency fields A formed in the aforementioned rectangle configuration in the above-mentioned example, The red filter 17R coloring film with the larger surface ratio to the aforementioned transparency field A among the light filters 17R, 17G, and 17B of green and three blue colors than a predetermined value It forms in the configuration which has width of face smaller than the width of face of the line writing direction of the aforementioned transparency field A, and the length covering the direction overall length of a train of the aforementioned transparency field A at least. Green and the blue filters 17G and 17B with surface ratio smaller than it By forming in the configuration which has width of face smaller than the width of face of the field between extension 13b of the aforementioned compensation-capacitance electrode 13, and length smaller than the direction length of a train of the aforementioned transparency field A A non-coloring light carries out outgoing radiation from the field of the side of the aforementioned filter 17R in the line writing direction of the transparency field A corresponding to large red filter 17R of the aforementioned surface ratio. It is desirable respectively that a non-coloring light is made to carry out outgoing radiation from the field of the side of the aforementioned filters 17G and 17B in the line writing direction of the transparency field A corresponding to the small green and the small blue filters 17G and 17B of the aforementioned surface ratio and the field of the side of the aforementioned filters 17G and 17B in the direction of a train. By doing in this way, the saturation and the luminosity of a color pixel of each color which are displayed by the coloring light which carries out outgoing radiation from two or more transparency fields A, respectively, and non-coloring light can be made to be able to balance better, and a color picture with still more sufficient color-reproduction nature can be displayed.

[0101] Namely, the transparency field A corresponding to red filter 17R with the aforementioned large surface ratio Since the area (area of the non-filter field b) of the non-coloring light outgoing radiation field occupied all over the field A is small, If it is made to carry out outgoing radiation of the non-coloring light also in this transparency field A from both the field of the side of the aforementioned filter 17R, and the field of the side of the aforementioned filter 17R in the direction of a train The outgoing radiation width of face of a non-coloring light becomes quite narrow, the bottom raising effect of the luminosity of the color pixel displayed by the coloring light which carries out outgoing radiation from this transparency field A, and non-coloring light will no longer be demonstrated fully, and the saturation of the aforementioned color pixel will become blackish.

[0102] Red filter 17R with the aforementioned larger surface ratio than a predetermined value as mentioned above However, width of face smaller than the width of face of the line writing direction of the aforementioned transparency field A, Form in the configuration which has the length covering the direction overall length of a train of the

aforementioned transparency field A at least, and from the transparency field A corresponding to this red filter 17R If a non-coloring light is made to carry out outgoing radiation only from the field of the side of the aforementioned filter 17R in a line writing direction Outgoing radiation of the non-coloring light can be carried out by sufficient width of face also from this transparency field A, the bottom raising effect of the luminosity of the aforementioned color pixel can fully be demonstrated, and the color pixel of good saturation and a luminosity can be displayed.
[0103] In addition, when it is made to carry out outgoing radiation of the non-coloring light from both the field of the side of the light filter in a line writing direction, and the field of the side of the light filter in the direction of a train, the transparency field A where the width of face of the outgoing radiation field of a non-coloring light becomes quite narrow, and the bottom raising effect of the luminosity of a color pixel is no longer demonstrated fully is a transparency field corresponding to about 90% or more of light filter in the aforementioned surface ratio.
[0104] Therefore, red filter 17R is formed in 90% of area of the area of the transparency field A as mentioned above. When forming green filter 17G in 70% of area of the area of the transparency field A and forming blue filter 17B in 85% of area of the area of the transparency field A Red filter 17R whose aforementioned surface ratio is about 90% or more Width of face smaller than the width of face of the line writing direction of the aforementioned transparency field A, It forms in the configuration which has the length covering the direction overall length of a train of the aforementioned transparency field A at least, and the field of the side of the aforementioned filter 17R in a line writing direction to a non-coloring light should just be made to carry out outgoing radiation from the transparency field A corresponding to this red filter 17R.
[0105] On the other hand, the transparency field A corresponding to green and the blue filters 17G and 17B with the aforementioned small surface ratio, respectively Since the area (area of the non-filter field b) of the non-coloring light outgoing radiation field occupied all over the field A is large, Like the transparency field corresponding to red filter 17R with the aforementioned large surface ratio, if a non-coloring light is made to carry out outgoing radiation only from the field of the side in a line writing direction The outgoing radiation width of face of a non-coloring light will become large too much, and the saturation of the color pixel displayed by the coloring light which carries out outgoing radiation from this transparency field A, and non-coloring light will become whitish.
[0106] The aforementioned surface ratio small green and the small blue filters 17G and 17B as mentioned above however, respectively It forms in the configuration which has width of face smaller than the width of face of the field between extension 13b of the aforementioned compensation-capacitance electrode 13, and length smaller than the direction length of a train of the aforementioned transparency field A. If a non-coloring light is made to carry out outgoing radiation from the field of the side of the aforementioned filters 17G and 17B in the line writing direction of the transparency field A corresponding to these green and blue filters 17G and 17B, and the field of the side of the aforementioned filters 17G and 17B in the direction of a train, respectively Outgoing radiation width of face of a non-coloring light from this transparency field A can be made into the range to which the saturation of the aforementioned color pixel does not become whitish while fully demonstrating the bottom raising effect of the luminosity of the aforementioned color pixel.
[0107] And if the color pixel of good saturation and a luminosity can be displayed also in the transparency field A corresponding to the light filters 17R, 17G, and 17B of which color, the saturation and the luminosity of a color pixel of each color can be made to be able to balance better, and a color picture with still more sufficient color-reproduction nature can be displayed.
[0108] In addition, the transparency field A corresponding to large red filter 17R of the aforementioned surface ratio Although it is good also as composition which carries out outgoing radiation of the non-coloring light only from either of the fields of the both sides of the aforementioned red filter 17R, like the above-mentioned example A gap is consisted and prepared between extension 13b of the compensation-capacitance electrode 13 which adjoins the edges on both sides and these side edges in the aforementioned red filter 17R, respectively. When it is more desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field of the both sides of the aforementioned filter 17R in the line writing direction of the transparency field A corresponding to this red filter 17R The saturation and the luminosity of a color pixel which are displayed by the outgoing radiation light from the transparency field A corresponding to the aforementioned red filter 17R can be made better.
[0109] The transparency field A corresponding to the small green and the small blue filters 17G and 17B of the aforementioned surface ratio, respectively Moreover, the aforementioned green and either of the fields of the both sides of the blue filters 17G and 17B, Although it is good also as composition which carries out outgoing radiation of the non-coloring light only from either of the fields by the side of ends, like the above-mentioned example Between the extensions of the compensation-capacitance electrode 13 which adjoins the edges on both sides and these side edges in the aforementioned green and the blue filters 17G and 17B, respectively, And a gap is consisted and prepared, respectively between line section 13a of the aforementioned compensation-capacitance electrode 13 and the

aforementioned shading films 16 which adjoin ends edges and these edges, respectively. When it is more desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field around the aforementioned filters 17G and 17B of the transparency field A corresponding to these green and blue filters 17G and 17B The saturation and the luminosity of a color pixel which are displayed by the outgoing radiation light from the aforementioned green and the transparency field A corresponding to the blue filters 17G and 17B can be made better.

[0110] In addition, in the above-mentioned example, red filter 17R which makes the light of a long-wavelength-region region penetrate is formed in 90% of area of the area of the transparency field A. Although green filter 17G which make the light of an elliptic-trochoidal-wave length band penetrate are formed in 70% of area of the area of the transparency field A and blue filter 17B which makes the light of a short-wavelength-region region penetrate is formed in 85% of area of the area of the transparency field A The desirable surface ratio to the transparency field A of these light filters 17R, 17G, and 17B As mentioned above, 90 to 95% by red filter 17R green filter 17G 70 - 80%, Are 85 - 90% in blue filter 17B, for example, red filter 17R is formed in 95% of area of the area of the transparency field A. Even if it forms green filter 17G in 80% of area of the area of the transparency field A and forms blue filter 17B in 90% of area of the area of the transparency field A, the balance of the saturation of red, green, and the color pixel of each blue color and a luminosity can display the high color picture of good color-reproduction nature.

[0111] In addition, as mentioned above The transparency field where the width of face of the outgoing radiation field of a non-coloring light will become quite narrow, and the bottom raising effect of the luminosity of a color pixel will no longer be demonstrated fully if it is made to carry out outgoing radiation of the non-coloring light from both the field of the side of the light filter in a line writing direction, and the field of the side of the light filter in the direction of a train Since the surface ratio to the transparency field A is a transparency field corresponding to about 90% or more of light filter, As mentioned above, 95%, when making surface ratio of 80% and blue filter 17B into 90% for the surface ratio of green filter 17G, the surface ratio of red filter 17R The aforementioned surface ratio about 90% or more of red filter 17R and blue filter 17B Width of face smaller than the width of face of the line writing direction of the aforementioned transparency field A, Form in the configuration which has the length covering the direction overall length of a train of the aforementioned transparency field A at least, and from the transparency field A corresponding to this red filter 17R and blue filter 17B It is desirable that a non-coloring light is made to carry out outgoing radiation only from the field of the side of the aforementioned filters 17R and 17B in a line writing direction.

[0112] Moreover, although two or more pixel electrodes 4 arranged in the shape of a matrix were made to correspond in a line writing direction and the direction of a train, respectively and the light filters 17R, 17G, and 17B of three colors of red, green, and blue are formed in them in the above-mentioned example You may form the large light filter (the above-mentioned example red filter 17R) of the surface ratio to the aforementioned transparency field A of these light filters 17R, 17G, and 17B in the shape of [which continues over two or more transparency fields A arranged to a line writing direction] a stripe.

[0113] Drawing 6 is some front view of the liquid crystal display in which the 2nd example of this invention is shown, and this example is formed in the shape of [which continues over two or more transparency fields A which arrange red filter 17R of the light filters 17R 17G, and 17B of three colors of red, green, and blue to a line writing direction] a stripe.

[0114] In addition, although the liquid crystal display of this example forms the aforementioned red filter 17R in the shape of a stripe, since other composition is the same as the liquid crystal display of the 1st example shown in drawing 1 - drawing 5 , the overlapping explanation attaches and omits a same sign to drawing.

[0115] The width of face smaller than the width of face of the line writing direction of a red, green, and the large light filter A of the surface ratio to the transparency field A of the light filters 17R, 17G, and 17B of three blue colors, i.e., a transparency field, according to this example, Since red filter 17R formed in the configuration which has the length covering the direction overall length of a train of the aforementioned transparency field A at least is formed in the shape of [which continues over two or more transparency fields A arranged to a line writing direction / simple] ASUTO ripe, the aforementioned red filter 17R can be formed easily.

[0116] Drawing 7 and drawing 8 show the 3rd example of this invention, and it is the expanded sectional view to which drawing 7 meets some front view of a liquid crystal display, and drawing 8 meets the VIII-VIII line of drawing 7 .

[0117] The pixel electrode 4 which adjoins each other in the direction of a train on both sides of the gate line 11 in the shading film 16 with which the liquid crystal display of this example was formed in the inside of the front-face side substrate 2 of the liquid crystal display element 1, and the field between four, Make it correspond to the field between the pixel electrode 4 which adjoins a line writing direction on both sides of a data line 12, and 4, and it prepares. The pixel electrode 4 which adjoins a line writing direction on both sides of the aforementioned data line 12 of the aforementioned shading film 16, and the portion corresponding to the field between four are narrower than the width of

face of extension 13b of the compensation-capacitance electrode 13, and it forms full [of the aforementioned data line 12] in wrap width of face.
[0118] In addition, although the liquid crystal display of this example made the aforementioned shading film 16 correspond also to the field between the pixel electrode 4 which adjoins a line writing direction on both sides of a data line 12, and 4 and is formed, since other composition is the same as the liquid crystal display of the 1st example shown in drawing 1 - drawing 5 , the overlapping explanation attaches and omits a same sign to drawing.
[0119] According to this example, the pixel electrode 4 which adjoins the direction of a train and a line writing direction, and the field where the aforementioned shading film 16 of the fields between four corresponds can be made into a dark state, and contrast of a display image can be improved further.
[0120] In this example, and the pixel electrode 4 which adjoins a line writing direction on both sides of the data line 12 of the aforementioned shading film 16 and the portion corresponding to the field between four Since it is narrower than the width of face of extension 13b of the compensation-capacitance electrode 13 and forms full [of the aforementioned data line 12] in wrap width of face, Reflect the outdoor daylight which carried out incidence in the pixel electrode 4 which adjoins a line writing direction, and the field which does not correspond to the aforementioned shading film 16 of the fields between four by extension 13b of the aforementioned compensation-capacitance electrode 13, and outgoing radiation is carried out ahead [of the liquid crystal display element 1]. Bottom raising of the luminosity of the whole screen can be carried out by the reflected light (non-coloring light).
[0121] In addition, although the liquid crystal display element 1 used in each above-mentioned example forms the so-called compensation capacitance of a storage-capacitance method by forming the compensation-capacitance electrode 13 independently [the gate line 11], its aforementioned compensation capacitance is good also as the so-called addition capacity method which used the aforementioned compensation-capacitance electrode 13 as the electrode of the aforementioned gate line 11 and one.
[0122] Moreover, although the above-mentioned liquid crystal display element 1 is the thing of the type which the transparency field A for displaying red, green, and a blue color pixel on a line writing direction arranged linearly together with alternation, and the transparency field A for displaying the color pixel of the same color as the direction of a train arranged linearly The aforementioned liquid crystal display element 1 each pixel electrode and the light filter of each color The transparency field A for displaying red, green, and a blue color pixel on a line writing direction arranges linearly together with alternation. The so-called delta array (it is also called mosaic array) type which shifted at a time to the line writing direction by turns about 1.5 pitches, and was arranged zigzag of thing is sufficient as the transparency field A for displaying the color pixel of the same color in the direction of a train.
[0123] Furthermore, although what has arranged the transflective reflecting plate 26 was used for the front face of the side light type lighting panel 25 in the above-mentioned example as a lighting means 24 to arrange behind the liquid crystal display element 1 A lighting means to arrange behind the liquid crystal display element 1 As [indicate / by the specification of Japanese Patent Application No. No. 353603 / nine to /, and Japanese Patent Application No. No. 120978 / ten to /, and the drawing / for example,] The transparent material which formed the reflective film in two or more of the ****, respectively while forming the front face in the stairway shaped surface is used. You may use the thing of composition of reflecting the outdoor daylight which incorporates the lighting light from the light source from the end face of the aforementioned transparent material, and carries out outgoing radiation from two or more level difference sides of the aforementioned stairway shaped surface and which carries out incidence from the front with the reflective film on **** of the plurality of the aforementioned stairway shaped surface.
[0124] Theoretically, the lighting means of this composition can indicate outdoor daylight still brighter than the liquid crystal display of the above-mentioned example by the reflected type while it will set up the luminescence brightness of the light source comparatively low and will lessen power consumption more, if this lighting means is used, since outgoing radiation of the light from the light source is carried out 100% and the incident light from the front is reflected 100%.
[0125] Furthermore, as a coloring film, although the liquid crystal display element 1 used in the above-mentioned example is equipped with the light filters 17R, 17G, and 17B of three colors of red, green, and blue, the light filter of three colors of a Magenta, yellow, and cyanogen is sufficient as the aforementioned coloring film, and it may prepare the aforementioned coloring film in the inside of the tooth-back side substrate 3 of the liquid crystal display element 1.
[0126]
[Effect of the Invention] While the liquid crystal display of this invention is arranged behind the liquid crystal display element of an active matrix method, and the aforementioned liquid crystal display element and turning and carrying out outgoing radiation of the lighting light to the aforementioned liquid crystal display element The compensation-capacitance electrode which was equipped with a lighting means to turn to the aforementioned liquid crystal display element the outdoor daylight which carries out incidence, and to reflect from the front of the aforementioned liquid

crystal display element, and was prepared in the inside of the tooth-back side substrate of the aforementioned liquid crystal display element by the metal membrane which has a high rate of a light reflex It forms in the configuration which has the extension which counters the side edge section of the aforementioned pixel electrode which is extended to the pixel inter-electrode field which adjoins a line writing direction on both sides of a data line from the line section which counters the end marginal part of the pixel electrode arranged to a line writing direction, and this line section, and adjoins a line writing direction in the edges-on-both-sides section, respectively. The aforementioned compensation-capacitance electrode of the fields respectively corresponding to two or more pixel electrodes, The field surrounded with the shading film which was made to correspond to the pixel inter-electrode field of the fields between two or more aforementioned pixel electrodes which adjoins each other in the direction of a train on both sides of the aforementioned gate line at least, and was prepared in the inside of a front-face side substrate, respectively It considers as two or more transparency fields which carry out outgoing radiation of the outdoor daylight which carries out incidence from the aforementioned lighting light which carries out incidence from a tooth-back side, and the front, and is reflected by the aforementioned lighting means ahead. While considering as the reflective field which is made to reflect the outdoor daylight which carries out incidence of the field corresponding to the aforementioned extension of the aforementioned compensation-capacitance electrode from the front at least by the aforementioned compensation-capacitance electrode, and carries out outgoing radiation ahead Area of the coloring film of two or more colors which two or more aforementioned pixel electrodes were made to correspond to one of insides, respectively, and were prepared is made smaller than the area of the aforementioned transparency field. Coloring light carries out outgoing radiation, respectively from the field corresponding to the aforementioned coloring film of two or more aforementioned transparency fields. In order for a non-coloring light to carry out outgoing radiation from the field which does not correspond to the aforementioned coloring film, respectively and for a non-coloring light reflected by the aforementioned compensation-capacitance electrode to carry out outgoing radiation from the reflective aforementioned field corresponding to the aforementioned extension at least of the aforementioned compensation-capacitance electrode, The luminosity of the screen by reflected type display is raised, and in order to compensate screen intensity, while lessening the frequency to which outgoing radiation of the lighting light is carried out from the aforementioned lighting means and reducing power consumption, the good color picture of contrast can be displayed with sufficient luminosity.

[0127] The coloring film of the 1st color with which the coloring film of two or more aforementioned colors makes the light of the long-wavelength-region region of the visible light-pattern regions penetrate in the liquid crystal display of this invention, When it is the coloring film of three colors of the coloring film of the 2nd color which makes the light of the wavelength component of an elliptic-trochoidal-wave length band penetrate, and the coloring film of the 3rd color which makes the light of the wavelength component of a short-wavelength-region region penetrate The coloring film of the 1st color of the above is formed in a larger area than the area of the coloring film of other two colors. When it is desirable to form in an area smaller than the area of the coloring film of the 3rd color of the above and it carries out the coloring film of the 2nd color of the above of the coloring films of two colors besides the above in this way The saturation and the luminosity of a color pixel of each color which are displayed by the coloring light which carries out outgoing radiation from two or more aforementioned transparency fields, respectively, and non-coloring light can be made to be able to balance, and the good color picture of color-reproduction nature can be displayed.

[0128] In this case, when a red filter and the coloring film of the 2nd color of the above are [the coloring films of the 3rd color of a green filter and the above] blue filters for the coloring film of the 1st color of the above, [for example,] The aforementioned red filter is formed in 90 - 95% of area of the area of the aforementioned transparency field. When it is desirable to form the aforementioned green filter in 70 - 80% of area of the area of the aforementioned transparency field, and to form the aforementioned blue filter in 85 - 90% of area of the area of the aforementioned transparency field and it does in this way The balance of the saturation of red, green, and the color pixel of each blue color and a luminosity can display the high color picture of good color-reproduction nature.

[0129] Furthermore, as for the pixel electrode and light transmission field of the aforementioned plurality, it is desirable for the width of face of the direction of a train to form in a large rectangle configuration rather than the width of face of a line writing direction, and by doing in this way, they can carry out outgoing radiation of the coloring light of two or more colors by turns in a small pitch from two or more transparency fields arranged to a line writing direction, can make those color mixture good, and can display the color picture of high resolution, respectively.

[0130] Thus, when forming the aforementioned light transmission field in the rectangle configuration where the width of face of the direction of a train is larger than the width of face of a line writing direction The coloring film with the larger surface ratio to the aforementioned transparency field among the coloring films of the three aforementioned color than a predetermined value It forms in the configuration which has width of face smaller than the width of face of the line writing direction of the aforementioned transparency field, and the length covering the direction overall length

of a train of the aforementioned transparency field at least. By forming a coloring film with surface ratio smaller than it in the configuration which has width of face smaller than the width of face of the field between the extensions of the aforementioned compensation-capacitance electrode, and length smaller than the direction length of a train of the aforementioned transparency field A non-coloring light carries out outgoing radiation from the field of the side of the aforementioned coloring film in the line writing direction of the transparency field corresponding to the large coloring film of the aforementioned surface ratio. When it is desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field of the side of the aforementioned coloring film in the line writing direction of the transparency field corresponding to the small coloring film of the aforementioned surface ratio, and the field of the side of the aforementioned coloring film in the direction of a train The saturation and the luminosity of a color pixel of each color which are displayed by the coloring light which carries out outgoing radiation from two or more transparency fields, respectively, and non-coloring light can be made to be able to balance better, and a color picture with still more sufficient color-reproduction nature can be displayed.

[0131] In this case, the surface ratio to the aforementioned transparency field forms in the configuration which has the length covering [with width of face smaller than the width of face of the line writing direction of the aforementioned transparency field / at least] the direction overall length of a train of the aforementioned transparency field for about 90% or more of coloring film, and the field of the side of the aforementioned coloring film in a line writing direction to a non-coloring light should just be made to carry out outgoing radiation from the transparency field corresponding to this coloring film.

[0132] And if the color pixel of good saturation and a luminosity can be displayed also in the transparency field corresponding to the coloring film of which color, the saturation and the luminosity of a color pixel of each color can be made to be able to balance better, and a color picture with still more sufficient color-reproduction nature can be displayed.

[0133] The large coloring film of the aforementioned surface ratio consists and prepares a gap between the extensions of the aforementioned compensation-capacitance electrode which adjoins the edges on both sides and these side edges, respectively. When it is more desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field of the both sides of the aforementioned coloring film in the line writing direction of the transparency field corresponding to this coloring film The saturation and the luminosity of a color pixel which are displayed by the outgoing radiation light from the transparency field corresponding to the large coloring film of the aforementioned surface ratio can be made more into fitness.

[0134] Moreover, the large coloring film of the aforementioned surface ratio may be formed in the shape of [which continues over two or more transparency fields arranged to a line writing direction] a stripe, and can make the aforementioned coloring film formation easily by doing in this way.

[0135] Between the extensions of the aforementioned compensation-capacitance electrode to which the small coloring film of the aforementioned surface ratio adjoins the edges on both sides and these side edges, respectively, And a gap is consisted and prepared, respectively between the line sections of the aforementioned compensation-capacitance electrode and the aforementioned shading films which adjoin ends edges and these edges, respectively. When it is more desirable that a non-coloring light is made to carry out outgoing radiation and it does in this way from the field around the aforementioned coloring film of the transparency field corresponding to this coloring film The saturation and the luminosity of a color pixel which are displayed by the outgoing radiation light from the transparency field corresponding to the small coloring film of the aforementioned surface ratio can be made more into fitness.

[0136] As for the aforementioned shading film, on the other hand, it is desirable for while to adjoin each other in the direction of a train on both sides of the aforementioned gate line, and to form in wrap width of face the field covering the line section of the aforementioned compensation-capacitance electrode which counters the pixel electrode of another side from the marginal part of a pixel electrode. The field corresponding to between the pixel electrodes which adjoin each other in the direction of a train on both sides of the aforementioned gate line by doing in this way It can shade over the line section of the aforementioned compensation-capacitance electrode which counters the marginal part of the pixel electrode of another side from the marginal part of aforementioned one pixel electrode, the optical leakage from the field can be abolished, and a color picture with more sufficient contrast can be displayed.

[0137] Moreover, by making it correspond to the pixel inter-electrode field which adjoins each other in the direction of a train on both sides of the aforementioned gate line, and the pixel inter-electrode field which adjoins a line writing direction on both sides of the aforementioned data line, preparing, and doing in this way, the aforementioned shading film can make a dark state the field where the aforementioned shading film of the pixel inter-electrode fields which adjoin the aforementioned train direction and a line writing direction corresponds, and can improve contrast of a display image further.

[0138] In this case, the portion corresponding to the pixel inter-electrode field which adjoins a line writing direction on

both sides of the aforementioned data line of the aforementioned shading film By being narrower than the width of face of the aforementioned extension of the aforementioned compensation-capacitance electrode, and it being desirable to form full [of the aforementioned data line] in wrap width of face, and doing in this way The outdoor daylight which carried out incidence can be reflected in the field which does not correspond to the aforementioned shading film of the pixel inter-electrode fields which adjoin the aforementioned line writing direction by the extension of the aforementioned compensation-capacitance electrode, outgoing radiation can be carried out ahead [of a liquid crystal display element], and bottom raising of the luminosity of the whole screen can be carried out by the reflected light (non-coloring light).

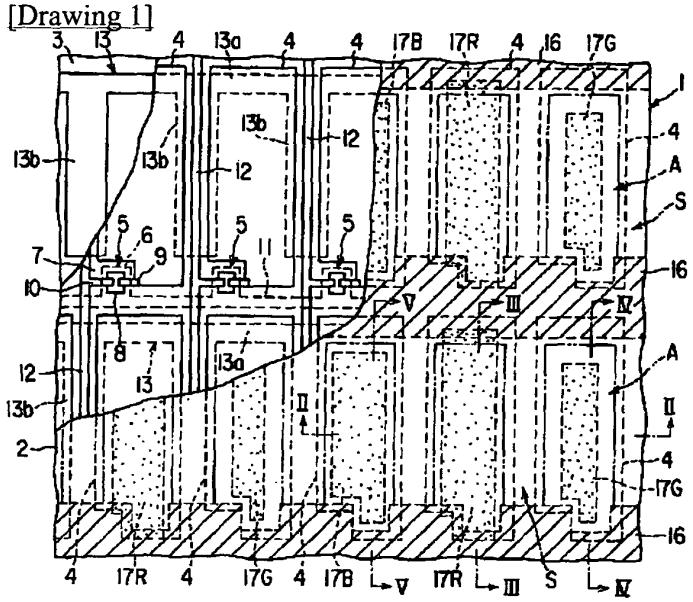
[Translation done.]

* NOTICES *

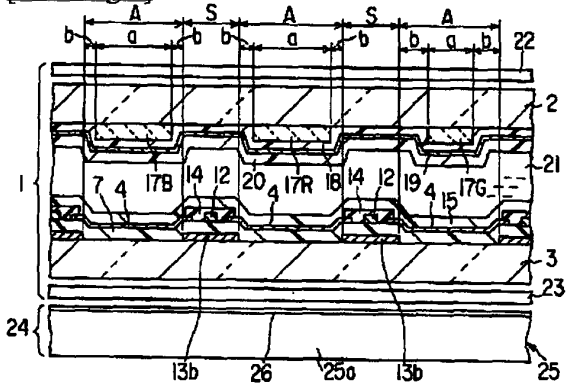
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

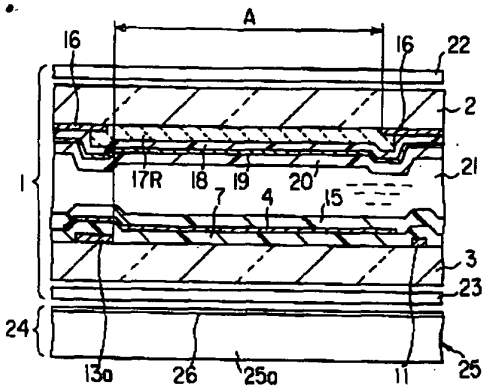
[Drawing 1]



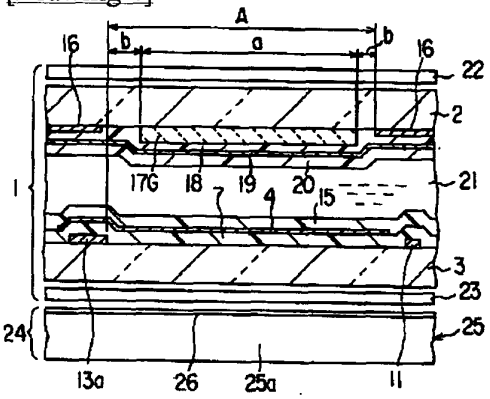
[Drawing 2]



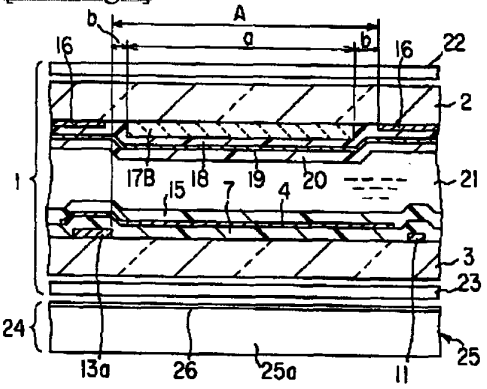
[Drawing 3]



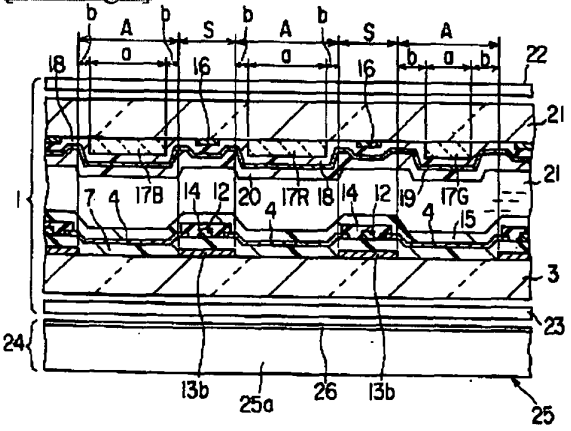
[Drawing 4]



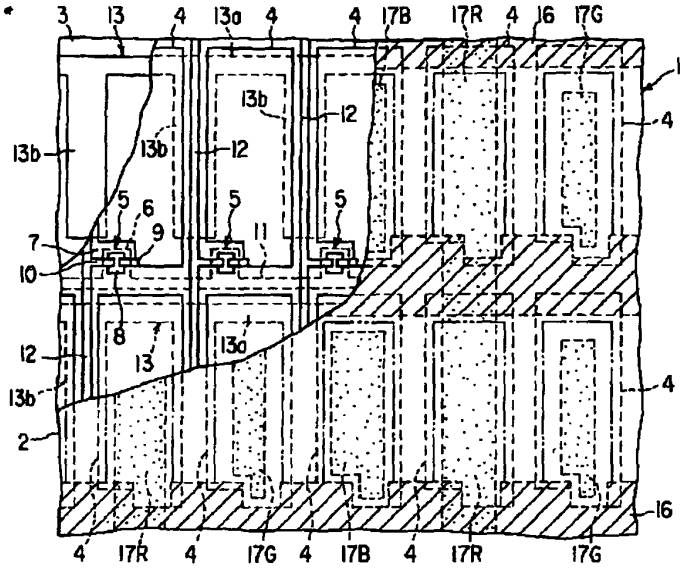
[Drawing 5]



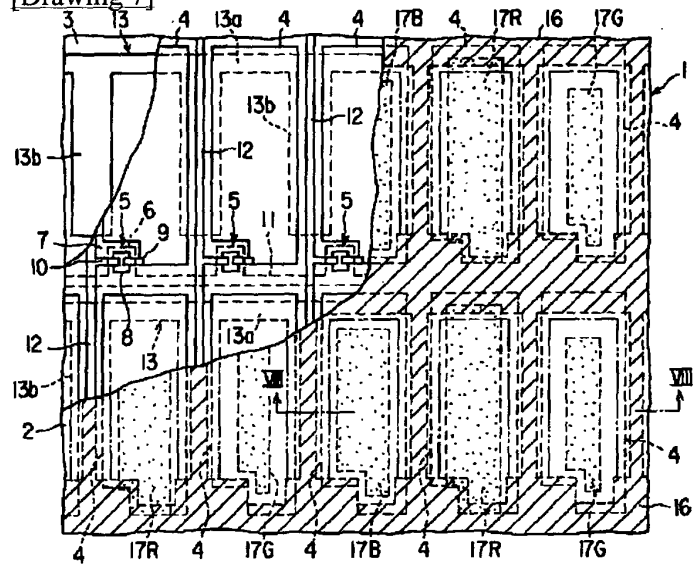
[Drawing 8]



[Drawing 6]



[Drawing 7]



[Translation done.]